



A compelling two-day conference featuring outstanding speakers, an extensive trade exhibition, premium South Australian food – where lamb is the hero – and an opportunity to communicate with all sectors of the lamb value chain.

- LambEx is for all breeds and all businesses -



JULY 9-11 ADELAIDE SHOWGROUND



PROGRAM & PROCEEDINGS

www.lambex.com.au

All enquiries to event manager Esther Price Promotions
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OUR PARTNERS:



Images courtesy of AWI, MLA and Superior Selections



Ridley & Wayville Pavilions Adelaide Showground Adelaide, SA July 9-11, 2014

LambEx is a collaboration between the SA Sheep Advisory Group, Meat & Livestock Australia, PIRSA, JBS Australia, Thomas Foods International, the State NRM Boards, AWI, the Royal Agricultural and Horticultural Society of SA and Fairfax Media.

LambEx 2014 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

South Australia is proud to host the third LambEx. All sectors of the lamb industry have come together to build on the previous LambEx success and ensure the Australian sheep and lamb industry continues its proud tradition of showcasing its industry via this forum. We are delighted that LambEx 2014 will coincide with the 175th anniversary of the Adelaide Show and as a consequence we have partnered with the showgrounds to utilise their exceptional facilities. Our organising committee represents every sector of the sheep and lamb industry and their enthusiasm in developing a program of informative and challenging speakers, of innovative exhibitors and a range of supporting activities around the event, is infectious.

They have ensured that LambEx is a high-end event comprising a two-day conference program, a significant trade show and the gala AWI Grands-lamb dinner that will culminate to be, without doubt, the lamb and sheep meat industry event of the year.

It is the vision of the LambEx committee that LambEx should move to another Australian state in 2016, to continue the charter of promoting professionalism of the lamb industry via this conference forum. It has been a great privilege to host LambEx and showcase the South Australian lamb industry to the rest of the country and we encourage other states to do the same.

LambEx 2014 has been underwritten by the South Australian Sheep Advisory Group together with a team of senior sponsors and collaborators, including PIRSA, MLA, AWI, JBS, Thomas Foods International, the State NRM Boards, together with the RA&HS and Fairfax Media. Numerous other sponsorships have been added to this mix and it is through these generous sponsorships that the registration fees to attend have been kept so low.

I commend to you this outstanding speaking program of LambEx 2014 and I encourage you to make the most of the coming together of every sector of our industry.



Allan Piggott
Chair, LambEx 2014



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LambEx Committee

Allan Piggott	Chairman, LambEx 2014
Jane Kellock	SASAG, Vice Chair, LambEx 2014
Jason Trompf	Immediate Past Chair, LambEx 2012
Bruce Hancock	PIRSA
Michael Blake	PIRSA
Luke Fitzgerald	SASAG
Catherine Golding	MLA
Megan Davies	MLA
Deanna Lush	Ag Communicators
Mark Inglis	JBS
David Rutley	TFI
Joe Keynes	Producer
Elke Hocking	Producer
Lynton Arney	Producer
Tom Ashby	Producer
Nette Fisher	Producer
Mark Scown	Fairfax
Tony Fox	NRM Boards
Richard Trethewey	NRM Boards

Special Thanks

The LambEx committee members have worked tirelessly on a number of special events and activities within the LambEx framework. Of particular note:

Deanna Lush	Design and implementation of the media campaign
Bruce Hancock	Design and implementation of the White Suffolks Young Guns competition and chairman of the LambEx sponsorship committee
Nette Fisher	Design and implementation of the Best Lamb competition
Jane Kellock	Chair of the catering committee
Michael Blake	Development of the SA food and wine trail during the PIRSA welcome
Lynton Arney	Sheep Logistics Coordinator
Tom Ashby	Design and coordination of the MerinoSA 60 ewes give away



Sponsorship and Underwriting

LambEx 2014 was made possible by the sponsorship and underwriting of the Sheep Industry Fund (SIF). The SIF exists to support programs which underpin the health, productivity and profitability of the wider SA sheep industry. All SA producers contribute to the SIF via a 35c transactional levy and the reinvestment of those funds is overseen by the producers via the SA Sheep Advisory Group (SASAG). These programs focus on improving on-farm productivity, biosecurity, predator control, market access and emergency preparedness.



The LambEx 2014 committee would like to acknowledge the following sponsors, without whose financial support the event would not be possible:

Major Partners

SA Sheep Advisory Group

Meat & Livestock Australia

PIRSA

JBS Australia

Thomas Foods International

Australian Wool Innovation

NRM Boards of SA

Fairfax Media Group

Royal Agricultural & Horticultural Society of SA

Major Sponsors

Gallagher

Novartis

Landmark

AMPC

MerinoSA

Virbac

White Suffolk Association of Australia

Future Farmers Network

Minor sponsors

Elders, AMIC and TAFE SA

Sponsorship and administration of the Best Lamb Competition.

Brecon Breeders

Sponsor of the Mahlia Coffee during LambEx.

Magnus Australia

Provider of the penning for the MerinoSA giveaway ewes.

Kelvale Kelpies

Provider of the Kelvale sheep dog pup as a competition prize.

Keith Pluckrose Transport

Provider of transport of the 50 Merino ewes to a SA location.

Sheep CRC, Murdoch University, Adelaide University and PIRSA

Technical and administrative support to the White Suffolk Association of Australia Young Guns competition.

UltraWhites

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A fusion of the best Poll Dorset and Dorper genetics

The UltraWhite is bred to suit a wide range of Australian conditions and suitable for self-replacing flocks and as terminal sires.

The flock is accredited Brucellosis free and is OJD vaccinated.

All rams are delivered freight free to all mainland States of Australia.

**Selected for do-ability
and hardiness**

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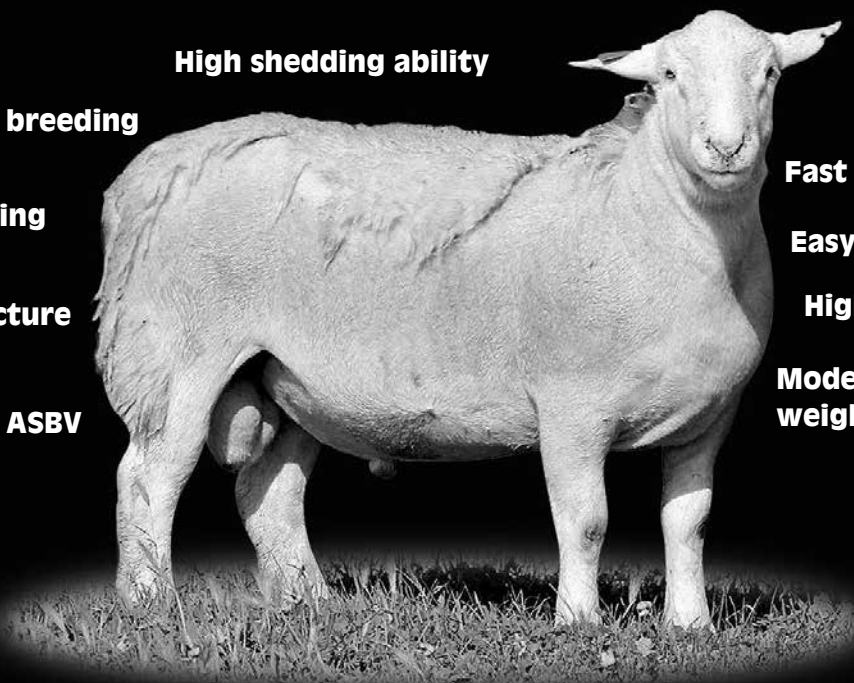
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Tested**

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Easy birth weights

High fertility

**Moderate adult
weights**



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Phone: Dawson Bradford

08 9887 7055 or 0407 470 553 (restricted)



HILLCROFT FARMS

Exhibitors

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

*This list is current at the time of going to press.

Advance Livestock Services

AgExAlliance

Allflex

ANZ

Aust Poll Dorset Association

Australian Border Leicester Association

Australian Dohne Breeders

Australian White Sheep Breeders' Association

Cashmore Oaklea

Ceva Animal Health

Charmac Merinos

Cleanskins Australia

Coles

CopRice

Dandaragan Mechanical Services

Dorper Sheep Society of Australia

Duenclin Studs

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Heritage seeds

Hillcroft farms

Interim Animal Innovations Pty Ltd

Inverbrackie Border Leicester Stud

Jurox Animal Health

Leader Products

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Lorelmo Keyneton Station

Magnus Australia

Meat Elite Australia

Multimeats

Paringa Livestock Genetics

PGG Wrightson

Practical Systems

Prime Samm Breeders Society of Australia

ProAdvice

Proway Livestock Equipment

Quality Wools/Quality Livestock

Rabobank

Rural Solutions/Sheep Connect

RuralCo/CRT

Sapien

SARDI

Shearwell Australia

SRS Company

Superborders

Tattykeel

Tru-Test

Watersave Australia Pty Ltd

White Suffolk Association

Zee Tags

General Information

Event Management

LambEx 2014 is managed by specialist agribusiness events management company Esther Price Promotions. For assistance at any time during the conference, please contact:

Donna Sykes 0412 44 77 88

Esther Price 0418 931 938

Esther Price Promotions

PO Box 341

Mundijong WA 6123

Tel: + 61 8 9525 9222

donna@estherprice.com.au

Best Lamb Competition

The Best Lamb competition is a new initiative and has not been done before at previous LambEx events. The Best Lamb competition has been managed and administered by a collaboration of Elders (Melissa Brook); AMIC and TAFESA. The competition has attracted an excellent range of entries that were judged at TAFE on July 9. Winners will be announced during the AWI Grandslamb dinner. The rules and guidelines are included in this proceedings for your interest and review and can be found on page 114.

Social Program

The AWI Grands-Lamb Gala Dinner will take place in the conference auditorium, commencing with the FFN pre dinner drinks in the Wayville pavilion at 6.30pm on July 10, with delegates moving into the re-designed Ridley area at 7.30pm for dinner. Dress is 'very smart'/casual. There is no set seating at the dinner, leaving delegates free to make their own seating arrangements.

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 AWI Grands-Lamb Gala Dinner with special meal requests must advise the conference organisers of their seating placement.



Supporting South Australia's sheep industry

PRIMARY
INDUSTRIES
& REGIONS SA
PIRSA

The Government of South Australia is proud to support LambEx 2014 through PIRSA's platinum sponsorship.

PIRSA's association with the State's valuable sheep and prime lamb industry stretches across numerous fields.

PIRSA's Agribusiness division, including its Meat and Livestock Account Manager, provides policy advice and acts as a direct link between the State Government and industry on a broad range of issues relating to sheep production and value adding. Through industry development, case and project management, PIRSA aims to maximise opportunities, minimise impediments, enhance trade and investment and facilitate growth and innovation.

Biosecurity SA safeguards South Australia's primary industries and strengthens our international market access. The State's sheep industry exports are underpinned by quality disease surveillance, assuring that South Australia is free of diseases affecting export potential and providing an emergency response capacity in the case of exotic disease detection. Biosecurity SA also monitors and assists with management of endemic diseases which threaten farm productivity, and works to detect livestock diseases that could affect public health.

Providing commercial consulting services to local, regional and international markets, Rural Solutions SA works with industry stakeholders to deliver projects supporting South Australia's broad acre livestock industries. Key partnerships with Australian Wool Innovation Limited, Meat and Livestock Australia, Sheep CRC and the Natural Resources Management Boards allow Rural Solutions SA to undertake projects which connect industry participants and share information throughout the livestock industries. These projects provide support and advice in livestock health and management, natural resource management, future planning and industry development.

Researchers in Livestock and Farming Systems at the South Australian Research and Development Institute (SARDI) are recognised nationally and internationally for their expertise and capabilities in sheep production, reproduction, health and welfare. Through its portfolio of science programs, SARDI aims to improve livestock reproduction using cutting edge techniques; investigate improvements in farming systems with an emphasis on the animal-plant interface; and conduct research on sheep meat production and the sustainability of grazing systems to increase industry productivity.

These activities recognise the significant value of South Australia's sheep and prime lamb industry and the importance of ensuring its sustainability. In doing so, PIRSA works to protect and enhance our State's reputation as a producer of premium food and wine from a clean environment on a local, national and global stage.

For more information visit www.pir.sa.gov.au



PREMIUM
FOOD AND WINE FROM OUR
CLEAN
ENVIRONMENT



PIRSA LambEx

Showcasing South Australia's

FOOD MENU

The LambEx menu captures the flavour and versatility of lamb with cuts chosen from nose to tail, drawing inspiration from lamb dishes around the world to shine the spotlight on Australian lamb in the global marketplace.

Accompanying this star ingredient is a range of produce sourced locally from South Australia. Food and wine are central to South Australia's identity and we take pride in producing some of the best food, wines and beverages in the world. Our clean air, healthy soils, pristine waters and Mediterranean climate produce diverse, delicious, fresh produce – whether meat, grains, dairy or a wide variety of fruit and vegetables. Most of our world-renowned wine regions are within an hour's drive from the State capital, Adelaide.

*All lamb on the LambEx 2014 menu is proudly and exclusively donated by **JBS Australia** and **Thomas Foods International**.*



Grilled Lamb Cutlets with Adelaide Plains Salsa Verde

Lamb Burger with **Beerenberg** Caramelised Onion

Lamb and Rosemary Sausage on **Baylies of Strathalbyn** Lavash with Apricot Compote

Lamb Kebabs with Adelaide Plains Oregano and **Smith Gully Orchards** Lemon

Lamb Kofta with **Moo Premium Foods** Mint Yoghurt

Lamb Tenderloin on **Paesano Bakery** croute with Baba Ghanoush

ChurrOz Lamb Empanada

Lamb Kidney and Devilled Sauce Tartlet

Fresh Kellshell Pacific Coffin Bay Oysters with **Smith Gully Orchards** Lemon



Welcome Function

outstanding food, wine and beverages

BEVERAGE MENU



BIRD
in
HAND

Bird in Hand
Sparkling Pinot Noir
2014
Adelaide Hills

What began as an experimental batch of sparkling made from Pinot Noir grapes grown on the home vineyard soon developed a loyal following and has since become the number one selling brand for Bird in Hand.



R Y M I L L
COONAWARRA

Rymill
The Yearling
Sauvignon Blanc
2013
Coonawarra

Fresh from the Rymill Coonawarra stable, the Yearling is a sassy Coonawarra Sauvignon Blanc. Made from estate-grown fruit, this crisp and appealing wine is absolutely perfect to enjoy now.



Langmeil Blacksmith
Cabernet Sauvignon
2010
Barossa

This Cabernet Sauvignon, the unsung hero of Barossa wine, has been matured for 24 months, achieving the structure, depth and balance expected from this premium Australian grape growing region. A perfect match with lamb!



Coopers
Light

Coopers Premium Light is brewed using traditional raw materials and brewing techniques, producing a lower alcohol beer which still displays a full flavour with plenty of malt and hop character.

Coopers
Clear

Coopers Clear is brewed using traditional raw materials and a specialised brewing technique to ensure a crisp, full-flavoured lager with the added bonus of having a lower carbohydrate content than other full-strength lagers.

Coopers
Original Pale Ale

Coopers Original Pale Ale is a refreshing and smooth, easy drinking ale guaranteed to turn heads. It is brewed using the finest raw materials and traditional ale brewing techniques, producing a clean, well balanced and compelling flavour with fruity and floral characters, a crisp bitterness and a noticeable malt character.



PIRSA Premium Food and Wine from Showcasing South Australia's

We thank the following
producers for participating in
the Premium Food and Wine
from our Clean Environment
Tasting Trail as part of the PIRSA
LambEx Welcome Function

919

919 Wines, Glossop
www.919wines.com.au
0408 855 272

Making different wines by thinking
outside the boundaries.



Amphora Wine Group, Stonyfell
www.amphorawines.com.au
(08) 8331 8459

Amphora Wine Group is a premium
wine producer, delivering a wide range
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Bird in Hand, Woodside
www.birdinhand.com.au
(08) 8398 0488

Established in the Adelaide Hills in
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products alongside the more traditional
cellar door.



Cheese Please, Murray Bridge
www.cheesepleasesa.com.au
0407 667 435

Cheese Please is an artisan
cheesemaker specialising in semi-hard
styles including Havarti and cheddar,
and some traditional surface mould
ripened styles.

Cleggett
WINES

Cleggett Wines, Langhorne Creek
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Cleggett Wines is the proud home of
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Indigenous inspired and flavour-focused
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Geraldton Hill, Bute
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Artisan toffees and sweet creations
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the finest, most decadent chocolate
products will do!



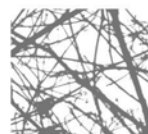
Illalangi, Waikerie
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Loom Wine, McLaren Vale
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PREMIUM
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our Clean Environment Tasting Trail

outstanding food, wine and beverages

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Producers and distributors of Muntrie berries, a South Australian native berry. Berries are sold fresh (in season), frozen, made into jams, chutneys, muesli and fruit straps. Muntrie Magic also promotes the berries by showing people various ways to cook and use them.

Nelshaby Capers, Nelshaby
www.nelshabycapers.com
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Producers of a full range of caper and caper-related products grown without irrigation.



Pangkarra Foods, Clare
www.pangkarrafoods.com.au
(08) 8846 2137

A proudly family owned and operated food business based in the Clare Valley, South Australia. Pangkarra Foods produces premium wholegrain dry pasta, stone milled wholegrain durum flour and wholegrain lavosh made from 100% durum wheat grown on farm, using sustainable farming methods.



Paracombe Premium Perry,
Paracombe
www.paracombepremiumperry.com.au
0402 082 532

Perry and cider producer from the Adelaide Hills.



Raidis Estate, Penola
www.raidis.com.au
(08) 8737 2966

Raidis Estate is Coonawarra's new 'kid' in wine. Family owned and operated, Raidis Estate takes a hands-on approach to wine production and is actively involved in all stages of the process.



Red Cacao, Stirling
www.redcacao.com.au
(08) 8339 3128

Red Cacao Chocolatier in Stirling is a boutique artisan chocolate shop in the heart of the Adelaide Hills. Come in and try one of our Belgian hot chocolates, or spoil yourself with a single origin coffee and chocolate experience in the cafe.



Shottesbrooke Vineyards,
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www.shottesbrooke.com.au
(08) 8383 0002

A proudly estate-grown and managed winery focused on producing high quality wines, with a commitment to grow whilst remaining a genuine boutique producer.



TAFE SA – Artisan Cheese Making Academy and Food Processing,
Regency Park
www.tafesa.edu.au
(08) 8348 1992

South Australia's leading provider of training in food and beverage processing.



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Hills-based business celebrating local produce – making relishes, pastes, pates, chutneys, brioche, crispbreads and shortbread biscuits, and selling through retail, wholesale, market stalls and functions catering.



Lambex 2014 Conference Menus

All lamb on the LambEx 2014 menus is proudly and exclusively donated by JBS Australia and Thomas Foods International. The menu design has been spearheaded by head chef at the Adelaide Showground, Simon Camp of the O'Brien Catering Group, in collaboration with MLA and the LambEx catering committee. Significant communication support has been provided by PIRSA, to ensure our LambEx menu is a celebration of premium SA food and wine.

Simon has been a wonderful resource to the LambEx team. Among his pearls of wisdom we've discovered as we've developed the LambEx menu are the following:

He says: 'I like to relate the different cuts of lamb to different types of cars:

- Best end (loin and rack) is like a Rolls Royce, high-quality, the very best of its kind
- Tenderloin is like a Ferrari, lean and sleek
- The shoulder is like a Holden Commodore, hard working, many uses, and good value for money
- The leg is like a Range Rover, versatile, can be used as a prime cut, roasted or as a slow cut, and is very sought after, great flavour with minimal fat. It's a high end all rounder!
- The neck is like a mini, small but tasty
- The rump is like a Subaru WRX. It wants to be like a tenderloin but just doesn't get there. It's still a very good cut though and a great substitute if you want to save so money.'

'Lamb is a great meat to work with because it provides so many variations, textures and flavours within the one animal. The Pulled Lamb Shoulder Sliders and Pressed Shoulder of Lamb are among my favourite dishes on the LambEx menu. The lamb for these dishes is slow roasted for 14 hours at 77 degrees and stays very moist with exceptional flavour.'

Simon Camp

O'Brien Catering Group

Novartis and Landmark Lunch Items



Thursday 10 July and Friday 11 July

- Lamb Barley Broth
- **Beyond India** Lamb Rogan Josh with Basmati Rice
- Pulled Lamb Shoulder Sliders
- Braised neck of lamb with tomato, capsicum and **McLaren Vale** olives, San Remo cous cous with fruit and **McLaren Vale** almonds
- **Vili's** Lamb, Mint and Rosemary Pies with **Beerenberg** Tomato Chutney

Coffee

- **Mahalia Coffee** (Robe)

AWI Grandslamb Dinner



Thursday 10 July

Food

Entrée

- Marinated Loin of Lamb with a Herb Aioli, Pickled Lambs Tongue with Sauce Gribiche and Ancient Grain Salad

Main

- Pressed Shoulder of Lamb, Baked Rump of Lamb with a Soft Herb Crust, Fondant Potato, Broccolini and **Hardy's** Red Wine Sauce

Beverages

Wine

- **Shottesbrooke** Estate Series Sauvignon Blanc 2013 (Adelaide Hills)
- **Bird in Hand** Sparkling Pinot Noir 2014 (Adelaide Hills)
- **Torbreck** Woodcutters Shiraz 2012 (Barossa)
- **Langmeil** Blacksmith Cabernet Sauvignon 2010 (Barossa)

Beer

- **Coopers** Light
- **Coopers** Clear
- **Coopers** Original Pale Ale

Coffee

- **Mahalia Coffee** (Robe)



Program

Wednesday, July 9

Welcome to LambEx – The PIRSA celebration of South Australia's outstanding food and wine

4.00pm	Registration Desk opens	Ridley Pavilion, Adelaide Showground
6.00pm	The Primary Industries and Regions South Australia (PIRSA) LambEx Welcome Function – celebrating some of South Australia's most respected food producers and winemakers – with lamb as the hero supplied by Thomas Foods International and JBS Australia.	
6.15pm	Welcome to LambEx	Allan Piggott LambEx Chair
6.25pm	Celebrating the RA&HS 175th anniversary	Richard Fewster President, RA&HS
6.30pm	Official opening	Hon Kyam Maher, MLC Parliamentary Secretary for Agriculture, Food, Wine and Fisheries
6.35pm	LambEx Head Chef	Simon Camp O'Brien Catering Group
6.40pm	The unofficial opening: An opportunity to celebrate lamb with our industry's Lambassador Sam Kekovich – who notches up 10 years in the industry's top job.	Sam Kekovich
8.00pm	Function close	

Thursday July 10


6.30am LambEx pre-event registration desk opens in the Ridley foyer

Strictly by prior booking only. 100 seat capacity at each breakfast.

7.00am	Option 1: Sheep Genetics Breakfast Seminar	Option 2: Grassland Society of Southern Australia Breakfast Seminar
	Genetics in Practice: An exploration of the progress, trends and financial benefits - with Hamish Chandler, Manager Sheep Genetics; Dr Rob Banks, Director Animal Genetics and Breeding and Greg Johnson, Agvet Services.	Busting ruminant nutrition myths - lessons of rumen research and industry uptake in the South Island of NZ: Jim Gibbs is senior lecturer and veterinarian of livestock health and production at Lincoln University and believes Australian farmers have lost focus on the importance of high quality green grass for ruminant animals, and have been side tracked (or even hoodwinked) into adding excessive fibre to overcome mythical protein toxicities and mineral in-balances.
8.30am	Breakfast seminar delegates reconvene at the Ridley Pavilion to join the other LambEx delegates.	

LambEx Day 1 - July 10

Master of Ceremonies: Ann Burbrook

7.45am	LambEx registration desk and tradeshow open	
8.45am	Welcome	Allan Piggott LambEx 2014 Chair
Session 1 – The power of consumers’ perceptions		
8.55am	Loos(e) tales of the sheep industry: United States cattle rancher and agricultural broadcaster Trent Loos challenges the Australian sheep and lamb producer to be beyond reproach – and then tell our tales loud and long.	Trent Loos Rancher, broadcaster and ‘advocate’, Nebraska, US
9.40am	The consumer pressure cooker: Australian sentiment takes its lead from the Northern Hemisphere and UK-based food marketing expert Professor David Hughes reaffirms that supermarkets world-wide are reacting to the consumer pressure cooker. If you think ‘ethical’ and ‘sustainable’ are buzz words now, project forward another 10 years and start planning for changes in on-farm production practices that will enable us to respect this market requirement.	David Hughes Professor of Food Marketing at Imperial College London, UK
10.15am	American sentiment to Australian lamb: Kim Holzner heads up JBS Imports – one of the largest importers and distributors of red meat in the States, handling product from Australia, NZ, Uruguay and Central America. Kim says if we can respond to the changing consumer sentiment to lamb in the US then Australia is well placed to capitalise on a remarkable business opportunity.	Kim Holzner Head of JBS Imports Colorado, US
10.45am	Morning tea	
Session 2 – The international lamb opportunity		
11.30am	A decade on: We ask MLA’s General Manager of Global Marketing Michael Edmonds to describe the Australian lamb producer and consumer of 2025 and how we might best prepare our product for that future.	Michael Edmonds General Manager of Global Marketing, Meat & Livestock Australia
12.00pm	Strategies for the Australian sheep producer to capitalise on the opportunities: Thomas Foods International speaks on behalf of the Australian processing sector as he considers how farmers and processors can learn from lost opportunities and capitalise on the future. He also elaborates on how future pricing signals might reward the industry for eating quality and yield to provide incentives for best practice.	Dr David Rutley Thomas Foods International
12.30pm	New generation MSA for lamb and yearling sheep meat: A look at what the next generation of Meat Standards Australia means for producers and processors.	Dr Alex Ball Program Manager, Eating Quality Research and Development, Meat & Livestock Australia
12.40pm	Tier 2 MSA and eating quality - the industry response: Alex invites a producer, retailer and restaurateur to answer this question, among others: Does everyone care enough about eating quality in order to reward the supply chain for delivering eating quality excellence?	Alex Ball with Kangaroo Island farmer Andrew Heinrich , together with wholesaler Kerry Melrose and MLA product development chef, Sam Burke
12.55pm	Novartis message	
1.00pm	The Novartis lunch	



Session 3 – Embracing Technology

2.00pm **Welcome back**

2.05pm **Embracing technology with a look at what's out there:** LambEx has challenged Melbourne city girl turned passionate agriculturalist Jo Newton to come up with her five favourite pieces of lamb industry technology that are destined to save time and labour. This is a fun, high energy, after lunch heart-starter that will be guaranteed to send you home with a renewed motivation to apply technology in a way you've not thought of before.

Jo Newton
University of New England
Armidale, NSW

2.20pm **Application of electronic identification on the average Australian sheep farm:** While the industry continues to discuss the use of RFID technology for traceability, LambEx says let's forget the politics for a moment and discover the very real potential for EID to revolutionise the way we look at lamb production.

Nathan Scott
Mike Stephens & Associates,
Victoria

2.45pm **Demanding technology:** Te Mania Angus stud's Tom Gubbins says the sheep industry should demand more from its seed stock sector when it comes to application of technology. And, he says this can apply to genetics, farm production systems, and marketing (through processor feedback).

Tom Gubbins
Te Mania Angus Stud,
Mortlake, Victoria


3.05pm **Ground truthing:** MLA Challenge contender John Ramsay has been tested in making numerous changes to his business. His mentor is the 'no boundaries thinker' and Western Districts of Victoria prime lamb producer John Keillor who spoke at LambEx 2012. John Ramsay comes to LambEx to give evidence that radical change to the way you approach farming is possible – just be prepared to accept the challenge.

John Ramsay
Bothwell, Tasmania

3.20pm **Panel session**

3.30pm **Building the lamb value chain of the future:** There's no brain drain in the lamb industry as this snapshot of up-and-coming contributors highlight. LambEx has invited more than 30 students and early-career, lamb industry professionals to submit their work or study for scrutiny which is all captured in our poster display. We meet a selection of these outstanding youngsters and discover their vision. Sponsored by the White Suffolk Association.

Assoc Prof Graham Gardner
Murdoch University/Sheep
CRC interviews our future
lamb industry professionals.



3.45pm **Break**

Session 4 – The looming nation-wide lamb industry threat of predators out of control

4.15pm **Predators out of control and coming your way:** From Big Brother to documentaries, blogger 'Farmer Dave' Graham leapt to the sheep industry's attention with his program Wild Dogs at War. Farmer Dave relives his documentary as he introduces a team of industry experts to share their stories and perspectives.

Session Introduced and facilitated by **'Farmer Dave' Graham**

4.20pm **Wild dog devastation:** A snapshot of the cost and impact to the Australian sheep industry of wild dogs out of control.

Greg Mifsud
National wild dog facilitator

4.25pm **The harsh reality:** Queensland fine wool Merino producer Karen Huskisson shares her family's story of devastation from invasive animals – so severe that she was within a blink of exiting the industry as the only remaining strategy for sanity.

Karen Huskisson
Wattle Downs Sheep Station,
The Gums, Qld

4.30pm **Learning from BiteBack:** SA's focus on wild dogs has been through the BiteBack program. This is a snapshot of what has and has not been achieved.

Heather Miller
BiteBack Program, SA

4.35pm **Cat havoc:** Semi-retired Murray Bridge country vet Jack Reddin is passionate about the insidious havoc wreaked by the feral cat. Jack provides a snapshot of this havoc in terms of financial and productivity impact on sheep farmers.

Dr Jack Reddin
Murray Bridge, SA

4.40pm **Panel:** We invite Trent Loos to join the session's speakers as we enjoy an all-in discussion to help discover new solutions to a growing problem.


Farmer Dave
Facilitator

5.00pm **Day 1 close**



6.30pm The Future Farmers Network pre-dinner drinks



7.30pm AWI GRANDSLAMB dinner



LambEx Day 2 – July 11

7.30am	<p>The Gallagher recovery breakfast: All delegates are encouraged back for a recovery start with great burgers and coffee on in the Wayville pavilion. The Gallagher recovery breakfast will feature Anthony Shepherd from Sheepmatters exploring the benefits of individual sheep management and specifically the gains to be made from identifying profitable versus unprofitable animals. This is a highly practical demonstration in the sheep handling area. Worth getting out of bed early for!</p>	
Session 1 – Optimising margins		
8.45am	<p>Survive and Thrive: Few will forget the powerful address from Jason Trompf at LambEx 2012 when he threw down the challenge to Australia's producers to 'get better at lamb survival'. Two years on, Jason returns to focus on the lost potential that sits in our back paddocks and suggest how the industry can capitalise on the opportunities for more ethical, sustainable and profitable improvements in lamb survival.</p>	<p>Dr Jason Trompf Principal, JT Consulting, Victoria</p>
9.30AM	<p>Becoming masters of pasture: Brad Wooldridge was at the beginning of the Pastures from Space technology 15 years ago and since then has teamed with Landgate to take it to a whole new level. He now uses LITE (Land Imaging For Technical Analysis) to analyse how pastures have performed over the last 8-year period and then explore how they could have performed given the season. Quantifying seasonal variation has allowed pasture performance predictions and matching stocking rate to the seasons predicted potential. Brad maintains the driver is management, not inputs. This thought-provoking presentation will challenge sheep producers to find the weak link in their pasture management, which, once corrected can lead to substantial growth in profit margin.</p>	<p>Brad Wooldridge Arthur River, WA</p>
9.55am	<p>Drought-proofing the family farm business – not the farm: Central West NSW Merino producer (15-23,000DSEs) and 2008 NSW Farmer of the Year, Nigel Kerin, went through droughts of last decade like any other mainstream producer, and came out of them with massive feed bills, depleted ecology, burnt-out people in the business – and an overdraft facility in the same shape. He and wife, Kate, decided eight years ago there must be a better way – to make money in the good years and not lose it in the bad years. They have since learnt that it is impossible to drought-proof farms – but you can drought-proof farm businesses. Nigel will give insight into what they have done to address climate variability in their 100% grazing business to keep it green and growing. This includes the importance of communication, planning for regular cashflow, 'retail agriculture', abundance thinking rather than existence thinking, and explanation about the crucial – yet simple – business practices they apply.</p>	<p>Nigel Kerin Yeoval, NSW</p>
10.20am	<p>Question session</p>	
10.30am	<p>The VIRBAC morning tea – we meet the Mystery Box apprentice butchers who have 1.5 hours to prepare a value-add story to their mystery box of lamb cuts. The winner will be announced at the end of the Landmark lunch.</p>	



Session 2 – New approaches to better business profits and sustainability on-farm and beyond		
11.00am	Redesigning a Merino: Mid North producer Andrew Mitchell has re-invented his family's approach to Merino production. He says the past three years have brought about measurable change as genetics have been optimised by astute use of ASBVs. This is a person who 'just loves wool' and, through a business approach to sheep management, can still admire wool cut and quality but now benefit financially through growth rates which have boosted farm margins.	Andrew Mitchell Mintaro, SA
11.15am	Double act: Landcare award winner and Merino and prime lamb producer Emie Borthwick has doubled her stocking capacity through a different approach to land management. Here's how she did it.	Emie Borthwick Eyre Peninsula, SA
11.30am	Where growth rate is central to profit: Charlie de Fegley is claiming lamb growth rates of 330 grams per day for their first 120 days. The fact that he knows this highlights the focus he places on growth rate and its link to production systems and profit. Charlie runs three discrete flocks and is in a unique position to talk about his focus on growth rates and the link to genetics, management and pastures across both Merino and prime lamb breeds.	Charlie de Fegley Ararat, VIC
11.45am	Audience Q & A	Panel
12.00pm	Innovation in processing: The selection of strategies we have just heard about will take these and other like-minded producers to another dimension, once the next round of innovations at a processing level, take effect. One meat industry researcher who is across all of the innovations is Dr Graham Gardner and LambEx has asked him to highlight the next big things in processing that will deliver the quantum leap to industry, before introducing colleague Graham Treffone who heads up one of the country's most exciting innovation in processing projects.	Assoc Prof Graham Gardner Murdoch University, WA
12.20pm	The quantum leap of robots in the boning room: JBS Innovation Manager Graham Treffone has been the driving force behind the installation of boning robots at the company's Bordertown plant. Since the installation JBS has moved from one to two shifts per day, employing an extra 200 people. The technology x-rays the carcass ahead of the boning which genuinely facilitates the move towards value-based payment, with increased yields and more accurately measured carcasses.	Graham Treffone Innovation Manager, JBS
12.35pm	Bringing sexy back! We reckon there is room to take Australia's lamb to even greater heights with a spot of ingenuity and MLA butcher Raf Ramirez agrees! What a great precursor to get the juices going ahead of the Landmark lamb lunch.	Raf Ramirez Meat & Livestock Australia
12.55pm	Landmark message	
1.00pm	Landmark lunch 	
Session 3 – People magic		
2.00pm	The horse whisperer: Acclaimed animal trainer Steve Jefferys has a remarkable string of credits to his name, getting horses (and dogs) to do what most would consider nearly impossible. Steve maintains that his policy of setting boundaries and providing reward to his team of animals is exactly the same strategy that is needed in managing human teams. He says getting staff to comply is no harder than safely putting horses on stage at the Sydney Opera House.	Steve Jefferys Horse trainer, NSW
2.40pm	Optimising outcomes: Successful succession is considered the holy grail of a farm business and so we turn to acclaimed conflict resolution specialist Allan Parker to draw on every resource available – from body to brain, to in-laws and outlaws. Get succession on the table he says, then discuss and resolve.	Allan Parker Peak Performance
3.30pm	The Fairfax Agricultural Media and MerinoSA prize draw  	
3.45pm	Close	Allan Piggott LambEx Chair

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A rare and final opportunity and one not to be missed

The US market for Aussie lamb – an introduction

Kim Holzner

JBS Imports, Greeley.

The United States of America is the market of consistent and steady opportunity for Aussie Lamb. Its stature as arguably the most important export market for Australian lamb producers is unlikely to change in the near future despite growing competition from export regions. This brief paper will explain why.

In the mid to late 1980s, meat industry pioneers from the then Australian Meat & Livestock Corporation (AMLC) and a number of processors, worked together and identified that there was an opportunity to build a better export market for Australian lamb. They identified that despite lamb being a distant 4th in the protein consumption stakes (behind beef, pork and chicken), there was a big opportunity for the Australian industry to move towards more dedicated meat production animals, targeting a particular type of large, lean lamb - a market not being well serviced by either the US domestic sector or the New Zealanders. New Zealand lamb is small, US domestic lamb is very, very large, and the sweet spot, particularly in the supermarket trade, was somewhere in the middle. Over 25 years later, the market has grown to annual exports of over 40,000 metric tonnes, nearly 45% of this as chilled lamb.

The US is the highest dollar value market for Australian lamb, and at any given time the first or second highest volume market. Whilst other markets may be growing at a faster pace, the US takes the highest value cuts on the carcass – the rack, the loin and the leg. The value of these three primals alone is vitally important to overall carcass return for the industry. The industry needs strong, viable and consistent export outlets for these primals, and the US market is the premier market.

The US lamb market is growing

Lamb consumption in the US has not changed much in the past 20 years; it sits around half a kilo per person per year, small compared to Australia where we eat around 10kgs per person per year. So it is hard to say that Americans are lamb eaters. Consumption was much greater prior to the second world war; theories abound as to why consumption declined, many have cited poor quality and prevalence of mutton in the meat supply chain turning many consumers off the product. In turn, the sheep flock in the USA has declined over the past 70 years, from a peak of nearly 60 million head in the mid 1940s, to just over 5 million today. The US simply cannot service the US population, and sheep ranching is almost a cottage industry. Consequently, imported supply sources have filled the void, and imported lamb is about 50% of the total lamb market.

But the market is growing and here is why. The US has nearly 320 million people, and is growing annually at around 0.7%. That's not a massive growth rate but importantly, over the past 10 years the growth in the US population has largely been driven by immigration; new Americans arriving from countries whose culture is more familiar with lamb, and these new Americans are more likely to be lamb eaters.

In addition, the US has gone through one of the worst recessions in nearly 100 years, a deep and long economic downturn that impacted every sector. Australian exports of lamb to the US were impacted, as consumers tightened purse strings and pared back discretionary spending. But the US economy is recovering, and with it demand from end users. We are already witnessing better demand for lamb, particularly in the foodservice sector, and as will be explained later, an uptick in activity in foodservice is a strong sign that the market is primed for improvement.

Lamb as a protein choice

Americans are accustomed to choice, and they like to have options. So when it comes to meat, the American consumer has a lot of choices – beef, pork, chicken, turkey, bison, game meat, lamb. By far, beef, pork and chicken are the most popular meats; however the 'tail' end continues to gather steam. This is because inherently, people like to try something different. In recent times lamb has become the new choice; it starts with the culinary scene, chefs and foodservice professionals who look for something to differentiate them from the crowd. Then it permeates to the home chef, the 'foodies' who like to prepare something interesting for their family and friends. This trickle-down effect is important to note; it is how new ideas in the food world reach the mainstream. Lamb is still a niche item, and will likely remain so for some time, but it has a premium position in a buzz category.

Whilst opportunities exist, there are a few headwinds. Lamb is, in many instances, is a very expensive protein vis-à-vis beef, pork and chicken. Its demand curve is less 'elastic' meaning that a change in prices impacts volume less than beef or pork for example, but when operators in either foodservice and retail scan their options, the cost per serving of lamb is a major consideration. Lamb was a casualty during the last recession, as consumers eat out less because of expense and restaurant operators strived for lower plate costs drive traffic back to their units.

US vs. Them

All too often we like to engage in patriotic behavior about our lamb – our Aussie lamb is better than theirs. Whilst we all believe that the quality of our Australian lamb is superior in many ways to other countries, it's important for us as in industry to keep an eye on 'team lamb'. In the US market lamb is a small player in a very large meat category, often crowded out by beef, pork and chicken. In recent years, efforts to promote the single category of lamb (regardless of country of origin) have proven to be good in theory, but hard in execution. It is important that all Australian producers to continue to work with their counterparts in other countries to help 'lift' the profile of the category, this is a role for the marketing bodies of each of the supplying countries.

Australia can and should always promote the individual characteristics that make our lamb 'the best', but growing the category will also benefit our industry. And with Australian lamb's inherent qualities, our product will naturally rise to the top.

Lamb in the meat case – the retail perspective

US retailers (supermarkets) are the volume driver for the Australian lamb industry. The retail meat director has a very important job. S/he is responsible for overall dollar sales in the category, typically charged with year on year growth across the board. They have to do this whilst managing/forecasting demand periods through the year and minimising shrink (loss of product). They need to construct a meat case offering as broad as possible without over complicating meat department operations in the stores. And every other department in the store is reliant on them – meat is a destination item, a core purchase for many consumers. Consumers typically 'build' their shopping basket around meal decisions, and meat is for most center of the plate.

Meat directors will often complain that lamb is a difficult to manage protein because of its smaller volume and higher cost structure, but the good operators will always have a lamb offering. This is because lamb is a premium item; it draws a specific customer to the store, it drives higher dollar baskets which is a key metric for many retailers. The lamb consumer is more likely to purchase higher margin items in the store; other food products, consumer staples. The lamb consumer is less likely to be concerned solely about price. In other words, the lamb consumer is a premium customer.

The good news for Australian lamb in the retail sector is that those supermarkets that have a truly have an active lamb program will continue to put effort into growing the category because of the positive impact it has on their business as a whole. Retailers who don't do a good job with lamb often recognize that they need to do better and this is often when they look for an imported source. Australian lamb is more consistent, year round, in terms of supply and specification. The improvement in quality in the Australian lamb industry over the past 10 to 15 years is a big reason for greater presence and demand in the retail sector.

Lamb in the foodservice sector – driving change

As mentioned previously in this paper, foodservice is a vitally important outlet for Australian lamb in the US market. Foodservice professionals pride themselves on doing things differently, inventing new food trends and styles. In the US, there is a number of food dedicated television channels that at any given time you can switch and learn about everything from America's best BBQ to a recipe for foam and bacon flavored chocolate. Foodservice is the breeding ground for new food ideas; those that take flourish and make their way into the mainstream through the restaurant trade and the television food shows.

For Australian lamb, and lamb in general, foodservice is a key areas to increasing awareness of the product, one which is as stated previously is crowded out often by beef, pork and chicken. Consumers who have lamb at a foodservice establishment are more likely to try it at home.

So the good news is that foodservice professionals like working with lamb because it is an interesting alternative to the more popular proteins, but more mainstream than game meat. And although replacing a traditional protein as a main menu item with lamb is sometimes a difficult task, if a chef is looking to replace a protein on the main menu, s/he is more likely to go with something different; and lamb fits that bill well.

But there are some challenges. As with retail, lamb is a comparatively expensive alternative to other proteins and at times of the year market pricing can lead to foodservice operators facing higher raw material costs than their budget initially allowed. Restaurants don't change their menu prices often so volatility in raw material prices can scare an operator away from putting lamb as a permanent menu offering. Often the result is lamb being relegated to the 'specials' menu, where price and availability are not so much of a concern.



Australian lamb producer – how to be part of the process

It's a long way from farm to fork, but every Australian lamb producer can do their bit to help sustain and grow this valuable market. Work with your processor – understand and strive towards desirability in lamb conformation, weight and yield, they'll tell you what the market wants. Understand that the key demand periods in the US and try to tailor your production cycles to match as best as possible; the US market is heavily weighted around two key demand periods – Easter and Christmas – the ultimate goal is to service these peak periods with large volumes to ensure that the industry has year round business, particularly during the Australian spring lamb season.

In summary, the future is bright for Australian lamb in the US market. It is a large market, with a large population, solid retail and foodservice sectors that like the product. Whilst other markets are creating more buzz at present, the US has been a solid customer for Australian lamb for over 25 years, and will be for another 25+ years.

A decade on: the Australian lamb producer and consumer of 2025 – how can the industry best prepare product for that future?

Michael Edmonds

General Manager, Global Marketing, Meat & Livestock Australia

In 2025 who will be hungry for lamb, what demographic trends will be playing out and what does Australia have to do to be a front runner to meet the needs of this future consumer?

The movers and shakers

Australia remains our most loyal and largest market for our lamb with nearly \$2 billion in annual sales. Lamb accounts for 14% of the protein pie at retail and 39% at foodservice. Although overall domestic lamb consumption remains strong, it appears to be levelling off (see figure 1) while the Middle East region is ramping up imports of Australian product and China has a growing appetite for sheepmeat (figure 2).

Figure 1 Australian domestic utilisation and exports

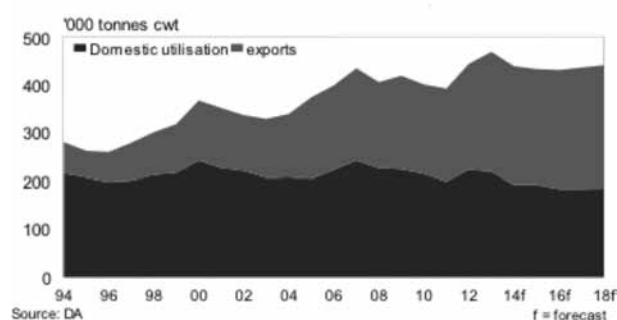
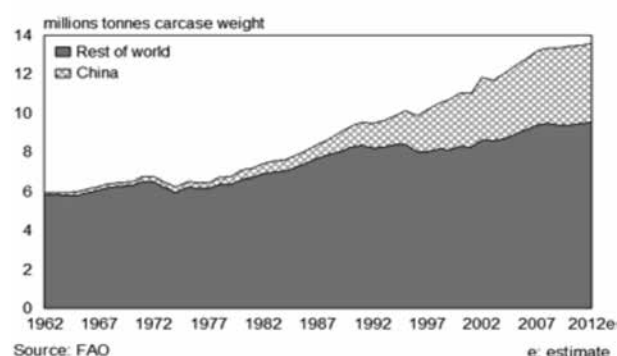


Figure 2 Global sheep meat consumption



Over the medium term, global demand is likely to outstrip the supply of sheepmeat, causing prices to increase and further consolidate sheepmeat's position as a niche product. In the next decade, the volume and composition of cuts to our traditional markets – North America, the EU and Australia – are unlikely to change significantly. In contrast, emerging markets are likely to grow their share of Australian lamb.

Who's getting hungry?

To understand the implications for lamb production in 2025, we need to know who will be eating our product and what their needs will be. To resonate with consumers in our markets today and into the future, MLA is using the results of global research it commissioned last year to understand the different segments which exist for Australian lamb in each of our major markets

Around three to five consumer segments have been identified for each market and marketing angles are being created for each. Here is a snapshot of three consumer segments in three of our high performing lamb markets: Australia, China and Saudi Arabia markets.

Australia	China	Saudi Arabia
'Food leader'	'Low interest'	'Traditional cooks'
Characteristics: <ul style="list-style-type: none"> • Social leaders • Love everything about food • Under 30 years old • High income • No children • Full time worker 	Characteristics: <ul style="list-style-type: none"> • Low cooking confidence • No interest in food, cooking or grocery shopping • High income • Children 	Characteristics: <ul style="list-style-type: none"> • Confident cooks • Uninterested in international food • Female • Over 35 years old • Children • Not currently working
Seeking: <ul style="list-style-type: none"> • What's new: food innovation and multi-cultural experiences • Education on new cuts and ways to cook • Ways to share and communicate their love for food 	Seeking: <ul style="list-style-type: none"> • Convenience is king – cooking convenient and low cost meals for the family • Meal components – cooked solutions they can present as finished dishes for the family • Portion control – paying for healthy value-added solutions 	Seeking: <ul style="list-style-type: none"> • Reassurance on imported meats (Halal, food safety) • Traditional applications for imported ingredients

Demographic drivers

Two of the biggest demographic trends emerging over the next decade are rising incomes and an ageing population. The intersection of these trends has important implications for lamb consumption and the diversity of cuts demanded.

In many countries and regions, the only growth age segment in 10 years' time will be the 40+ age group. Meat consumption tends to decline with age (see figure 3), but the good news for lamb is these older consumers will be increasingly cashed-up and will have a higher propensity to spend (see figure 4). Today's consumers, who are busy raising families or climbing the corporate ladder, will, in 10 years, be more focused on life experiences, health, quality of life, travel and technology and, in their world, quality will trump quantity.

Figure 3: Australia's ageing population

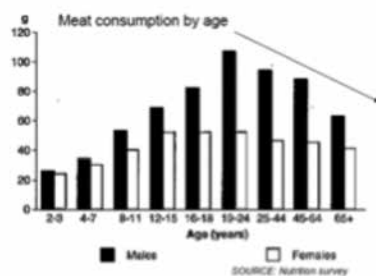
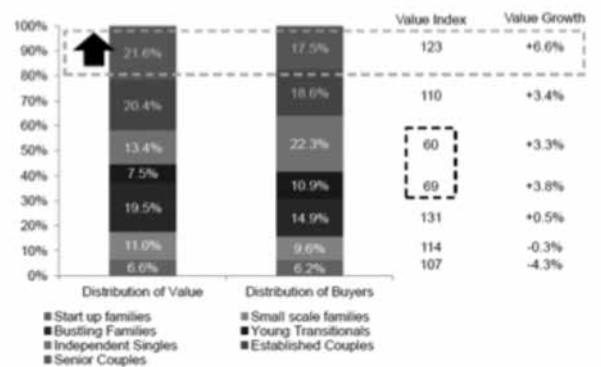


Figure 4: Older consumers have a higher propensity to spend



Think global, act local

A number of consumer psychographic trends will impact on the consumer of tomorrow. These include:

1. **Global village** – social media, immigration and frequent travel means people over the world will continue to adopt culinary fads and trends. These will be many and varied. The role of lamb as a niche product and “something new” may provide opportunities for increased penetration in markets such as the US and Canada.
2. **Natural source** – connecting to the source will be increasingly important for consumers – where is it from, what is the provenance, is it natural, do I trust and believe in who produces it? This is a great opportunity for premium Australian lamb.
3. **Healthy ageing** – we will all be living longer and wanting to eat healthy to avoid a poor quality of life after 60.
4. **Absolute integrity** – the digital age demands compete truth. With one mobile device, consumers can already find the facts and spread the word about brands that do not live up to expectations. This is a risk but also an opportunity that can be an advantage for the lamb industry through product traceability and high integrity in environmental and welfare standards.
5. **Convenient accessibility** – life won't get any slower in 2025. People will want to eat quality meals that are convenient and fit an even busier life than today. Additionally we will get what we want, when we want it. We can already order a book in the middle of the night and have it within 48 hours – or instantly via e-reader. In 2025, a consumer in Beijing will order lamb chops from a producer in South Australia and receive it a few days later.

What's on the menu?

Maintaining markets for both higher value products and affordable cuts is critical to ensure the value of the carcass is maximised.

While more established markets have a preference for higher value cuts (such as racks, legs and loin cuts), more affordable cuts (such as breast and flap and whole carcasses) are the mainstay in emerging markets like China and the Middle East (figures 5 and 6).

Figure 5: Australian lamb exports by cut to the Middle East/North Africa region

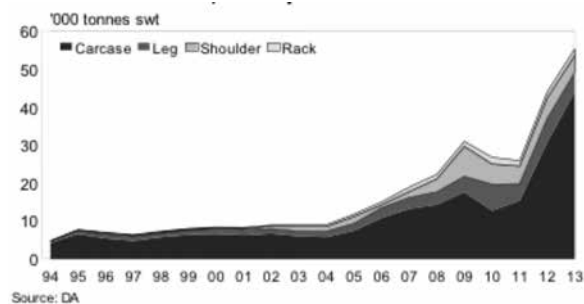
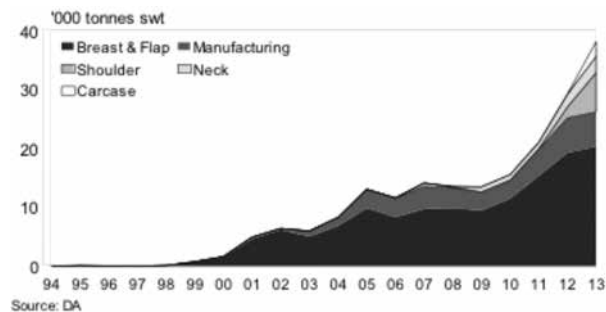


Figure 6: Australian lamb exports by cut to China



As incomes rise in these markets, cut preferences are likely change to varying degrees. To some extent, emerging markets are likely to continue demanding more affordable cuts due to strong cultural preferences. The chilled lamb carcass trade to the Middle East region has grown rapidly in recent years, despite the high cost of Australian product and Ramadan falling in the hottest months. In the future the Middle East is likely to remain price sensitive and demand more affordable cuts although niches will continue emerging for high quality product within its booming tourism industry.

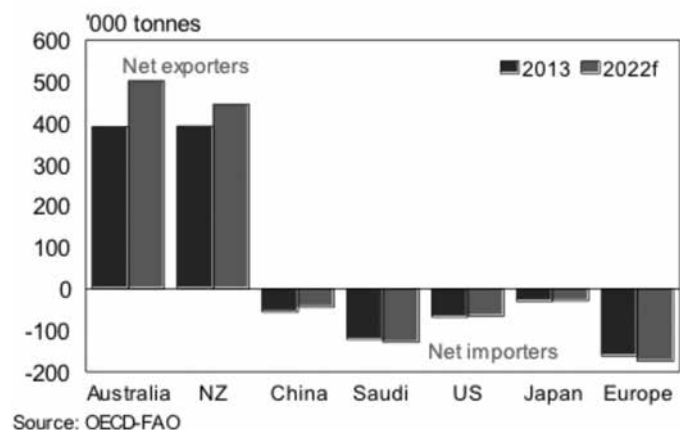
China may have more room to move on price, experimenting with new cuts given higher incomes. If Australian lamb supplies increase, the bulk of the lamb export growth in China is likely to be in frozen breast and flap and manufacturing cuts for hot pot dishes at foodservice – with further growth also in shoulders. However, the highest percentage lamb growth could be in the small trade in lamb racks, legs and carcasses for the expanding western restaurant sector – driven by foreign trade business and tourism. The mutton growth is likely to remain in frozen carcass and breast and flap.

Who's going to supply?

While New Zealand is likely to remain a major lamb exporter over the next decade, its wings have been clipped. The drought and the dairy industry have enticed producers away from sheep production. Flocks and production in China and the Middle East are forecast to rise but domestic consumption is expected to take up the slack as these nations remain net importers (figure 7).

Figure 7

Lamb trade balance



On the other hand, Australia is well positioned to ramp up supplies assuming average seasonal conditions, a continual improvement in lamb marking rates and average carcase weights. While the first is uncontrollable, producers have made great inroads into the latter two but need to continue on this path.

MLA has a suite of R&D and extension resources to assist industry with this challenge. Be sure to visit the 'next steps' and the MLA stands at Lambex to find out more.

The next step

So we've caught a glimpse of what the marketplace may look like in a decade. But how is Australia going to win consumers over? That's a job for both marketers and producers!

On the marketing side, MLA is rolling out the global 'True Aussie' brand to underpin our marketing activities for lamb, beef and goat in each market. 'True Aussie' is about showcasing to our customers 'Brand Australia': our island disease-free status and natural environment; our trustworthiness in delivering product to the highest standards of safety and integrity; and our product not only tastes great, it offers healthy, relaxed and shared enjoyment.

MLA will also continue drilling down into each market to monitor demographic trends, identify consumer segments and target them with messages about lamb in ways that resonate. More leg work will be needed across the globe to find homes for the full suite of products from the carcase – particularly cuts beyond loins, racks and legs.

On the supply side, producers have done an impressive job over recent decades, moving beyond the sheep's back to developing a professional prime lamb industry from scratch to one that's now the envy of the world. But the journey isn't over. The world is growing hungrier for lamb and Australia has the opportunity to satisfy that appetite if it can ramp up supplies and continue to produce a great quality 'true Aussie' product.

Capitalising on opportunities for the future

David Rutley PhD

Lamb Supply Chain Coordinator
Thomas Foods International

Background

The lamb industry, since moving on from being a minor component of the sheep industry, has been very active in seeking and utilising opportunities. When asked to consider lost opportunities the first response could be:

What missed opportunities? Is the lamb industry not rocketing along?

Over the 14 years, 1998-2012, lamb production margins of producers who benchmark have grown 7 ¢/kg HSCW per annum, as returns have consistently grown faster than costs (Sandy McEachern Holmes Sackett & Associates, 2013). Producer margins are rising not falling, let alone out stripping declining terms of trade. And that was before lamb grids hit \$6/kg HSCW. The long term trend (1998 – 2013) of the Eastern States Trade Lamb Indicator (ESTLI) is +20¢/kg HSCW p.a. (MLA, 2014).

During this period we, the Lamb Industry has:

1. Taken on the world's best red meat quality systems to ensure access to markets, gaining access to every market in the world and these markets are growing;
2. Taken Lamb from a staple protein, often consumed more than three times per week, to a premium luxury item at the top end of the Australian housewife's budget;
3. Developed Eating Quality Assurance through Meat Standards Australia (MSA) and this development is continuing;
4. Had two Sheep CRCs and have accessed funds to extend it for another 5 years, in the shadow of the federal government austerity cuts. These funds will ensure innovation and technology improvements to take our industry forward.

What opportunities have we missed?

Thomas Foods International

Thomas Foods International (TFI) processes of the order of 20% of Australia's lamb, of which approximately 70% is exported, accounting for around 8 to 10% of global lamb exports.

TFI operate 4 processing plants, Murray Bridge, Lobethal, Tamworth and Wallangarra, and buy small stock nationally to sell globally, supplying 70 to 80 countries.

Our major markets are

1. the domestic market (~30%) supplying food service and retail including Coles, Woolworths, IGA and butchers, and;
2. the export market (~70%) of which 50% supplies the USA with the remainder going to Middle East, China, Europe and others.

TFI clearly see the value chain focused on the consumer and have presented an extremely professional view of the TFI value chain, as seen on our web site (TFI, 2013). This video presents the supply chain in reverse, the 'Value Chain', following the direction of the market signals from the consumer back through distribution, processing and finishing to lamb production.

The Chinese market

China is the largest producer and consumer of sheep meat in the world, producing about four times as much mutton and lamb as Australia (Brester, 2012). Currently China's ability to produce lamb and mutton is falling behind its consumption and by 2020 it is expected that China will need to import between 0.1 to 0.3 million tonnes of mutton and goat meat annually (Zhou *et al.*, 2012). This is 4 to 12 million head at 25 kg HSCW, 20 to 60% of Australia's current production. Since 2000 China has commenced significant importing and in the first half of 2013 China's lamb imports from Australia rose 34% year on year, accounting for 18% of Australia's lamb exports (Uchida, 2013).



It is also noteworthy that China's wealthy population is very concerned about food safety and so quality assurance systems are high on their list of priorities. This point brings us to take heed of the advice that the Asian food value chains are developing rapidly with a high level of sophistication, learning from our established value chains (Reardon, 2012)

TFI and the International Sheep Meat Forum

TFI were asked to attend the International Sheep Meat Forum in Brussels in October 2013. Paul Leonard presented "Productivity Risks for Lamb Processors in Australia" to the European audience, discussing issues such as climate variability, grass seeds and wild dogs (Leonard and Rutley, 2013).

Paul found that although the Europeans accept our, Australia's, mob based traceability, their member states are applying as much political pressure as possible to demand all importers provide individual animal traceability. This pressure will increase if food safety scares, such as the recent Brazilian case of BSE, continue to occur.

Risk – mandating electronic identification for lambs

It is possible that the EU could change its stance on Australia's mob based traceability if enough internal pressure is applied. In this case they could demand our exporters require individual animal identification, most likely electronic ID (EID), thus effectively mandating EID for Australian processors and producers looking to access the European market.

The mandatory imposition of individual animal traceability would pose a major cost to our lamb industry and TFI do not support such an imposition.

Opportunity – voluntary adoption of EID for lambs

Apart from traceability, EID provides industry with the ability to significantly improve livestock management. Improved management will provide various benefits to different sectors of the red meat supply chain from stud breeders through commercial producers and finishers to processors.

The ability to measure and manage, or better still, monitor and control production based on individual animals will allow the supply chain to identify superior stock to direct to specific customers and consumers.

Examples of value from individual animal identification

Excluding the value of individual animal identification for traceability for food safety and exotic disease control, individual identification can improve market signals and increase the overall value of specific supply chains. The ability to supply the right product to the right customer/consumer will increase the customer's expectations resulting in repeat patronage. Expectations are based on previous experience and customers relate their perception of value to the price they pay for a product. If the customer perceives value they will return, expecting the same as they received last time, that is customers are looking for consistency. Woolworths have determined that "Consistency provides opportunity" (McEntee, P., 2012, General Manager Woolworths Fresh Food, personal communication).

Rangers Valley Cattle Station

Rangers Valley is a major feedlot near Glen Innes, northern NSW. This feedlot feeds Angus and Murray Grey cattle and some of their crosses for 300 days targeting the highly marbled Japanese market.

In the 1990's Rangers Valley Cattle Station commenced manually identifying individual animals. Individual animal identification has allowed Rangers Valley to collate data including steer entry weights with days on feed, exit weights, carcass weights, fatness and marble scores. This data can then be allocated to vendors and used to calculate the performance of steers supplied by different vendors, thus predicting the future performance of a particular vendor's cattle (Rutley and Pitchford, 1997). Since 1994 Rangers Valley have been predicting vendor performance and have achieved gains of \$20 per steer fed (Eldershaw, 2012).

An increase of \$20 per 400kg feeder steer only equates to 5¢/kg live weight, for which few producers would commit to a forward contract, even though it equates to an extra \$1,000 per load (50 head). However, annually this is worth \$750,000 to Rangers Valley. In applying this selection pressure since 1994, Rangers Valley have effectively eliminated the bottom 20% of vendors from their supplier list.

This is not to say that these vendors are not producing good valuable cattle, simply that these cattle are not suited to Rangers Valley's market. Therefore it is in the industry's best interest to identify these suppliers and direct them to markets where their cattle are suitable.

These comparisons could not have been made without individual animal identification. The use of EID has simply automated the data collection reducing errors and costs, adding further value.

Some lamb feedlots are sending lambs to market in vendor lots to enable them to get vendor performance figures, similar to those of Rangers Valley. Without EID this practice is time consuming and expensive, though ultimately valuable.

Genetic selection for fertility by a stud selling commercial rams

Studies based on the Sheep CRC's Information Nucleus Flocks indicate that, over a 10 year time period, simply collecting lamb pedigree and survival data will increase the number of lambs weaned per 100 lambs born by 1% (Forbes Brien, University of Adelaide, personal communication).

Given current values, an extra lamb at 20 kg HSCW and \$5.00 /kg HSCW is worth \$100 and with 120% lambing an extra 1.2 lambs would be weaned, worth \$120. Assuming two rams are required to cover 100 ewes each ram is worth and extra \$60 and if a stud clears 100 rams at sale an extra \$6,000 value of rams will be sold. This extra annual value will be created by providing EID for about 150 stud sheep and recording pedigree and lamb survival to weaning.

Other ways to use EID

Walk over weighing allows producers to manage stock in several ways:

1. The body weight of pregnant ewes can be maintained with targeted supplementary feeding to a) ensure all ewes are in good condition for mating; b) they lose less weight during pregnancy and lactation and c) they recover from pregnancy quickly to prepare themselves for the next mating.
2. Lamb growth can be automatically monitored and then lambs can be drafted based on weight in preparation for market. Auto drafting saves time and labour (Brown *et al.*, 2014).

The Canadian beef industry has developed a system for continual weighing stock every time they drink, allowing growth to be monitored and turn off times to be predicted well in advance.

Currently it is considered that EID is viable for lamb feedlots, but possibly not for the wool sheep industry, though this may be debated. Some general comments were that the hardware and software could use further development especially with respect to user friendliness (Bob Hall, consultant Icon Agriculture, WA, personal communication).

What opportunities have we missed?

The price of EIDs is slowly coming down and has just fallen from 90 to 83 cents per tag in Victoria, though it is still \$1.10 per tag in other states (Arnel, 2014). However, as lamb carcasses are approximately 10% of the weight of beef carcasses EID is around 10 times more expensive for lamb producers. Consequently, producers are still avoiding adoption of EID for lamb, citing concern about mandatory adoption (Chapple, 2014).

Either mandatory or voluntary adoption of EID.

Scenario 1: Mandated adoption

If EID is mandated every producer will have to purchase many tags, a shortage of tags will ensue and prices will rise as a result of supply and demand forces. The increased demand and profits will draw new EID producers to the market. Competition – supply and demand will reduce the price to some fair and profitable equilibrium.

Outcome: Much expense and stress involved with a sudden requirement to EID all sheep.

Scenario 2: Voluntary adoption

The lamb industry will determine the value of EID across the value chain. Progressive chains will adopt EID voluntarily at existing, but viable prices given their markets and associated premiums.

As EID sales volumes increase competition will enter the market bringing prices down and making EID viable for other markets. et cetera.

Outcome: A gentle transition to higher quality knowledge and an EID market equilibrium with higher volumes and lower prices.

Neither TFI or any part of our supply chain proposes that we support the mandation of EID. We believe that such mandation would impose significant costs on the industry and cause considerable hardship.



However, knowing that our consumers require consistency (McEntee, pers. comm.) and our value chain requires information and knowledge, and noting that Woolworths purchased a 50% share of Quantum a market analysis company (Mitchell and Ramli, 2013), we at TFI see a great opportunity in the voluntary adoption of EID by lamb value chains and, over time, the industry as a whole.

When times are good we don't need to improve When times are tough we cannot afford to improve

At the moment times are good for the Australian lamb industry.

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Evolution in providing sheep meat eating quality that meets future consumer requirements

Dr Alex Ball

Meat and Livestock Australia

Consumers demand quality – is industry responding?

Satisfying consumer expectations, particularly for eating quality, is critical to maintaining and increasing demand for Australian sheepmeat. Consumers are increasingly looking for more from lamb including; being loved as an Australian product, improved convenience, more delicious to eat, improved health attributes and more enjoyable meal experiences. These and other key attributes are summarised in the following survey:

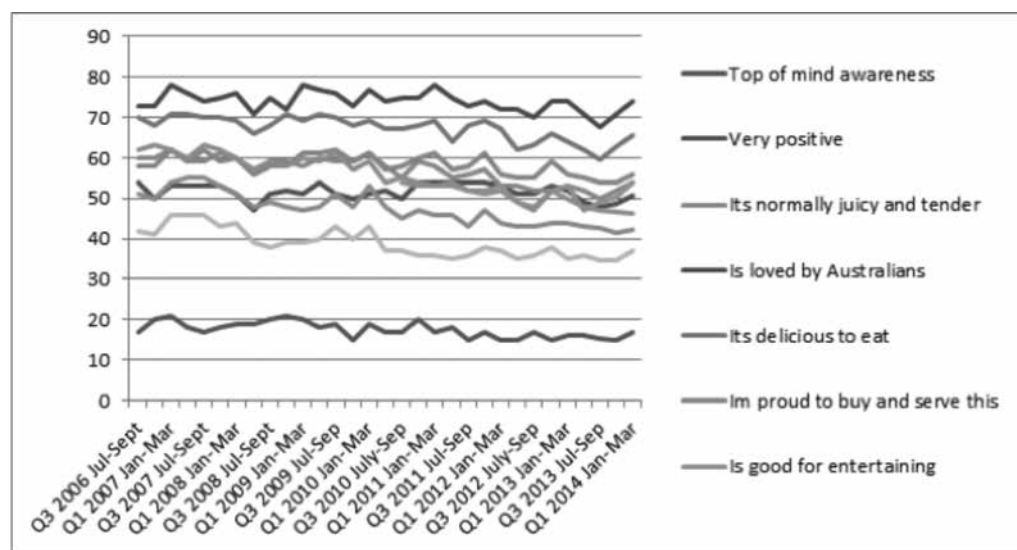


Figure 1. Key consumer requirements for Australian lamb

Industry is responding to the eating quality element with strong rates of adoption and growing volumes of lambs being MSA trademarked. However, expectations will continue to demand further differentiation and identification of lamb and sheepmeat eating quality. Therefore, in order to continue to improve eating quality, the Australian sheepmeat industry must focus on quality throughout the entire supply chain. Each sector of the sheep industry has a clear impact and therefore has great responsibility in ensuring that each time product hits a consumer's plate the highest level of eating quality is achieved. When any part of the supply chain neglects eating quality the consumer is ultimately affected. In such occurrence two things may occur; price willing to pay decreases or demand for the product declines. As a result MLA's strategy for improving eating quality has investments in all stages of the sheep industry, as evidenced in figure 2.

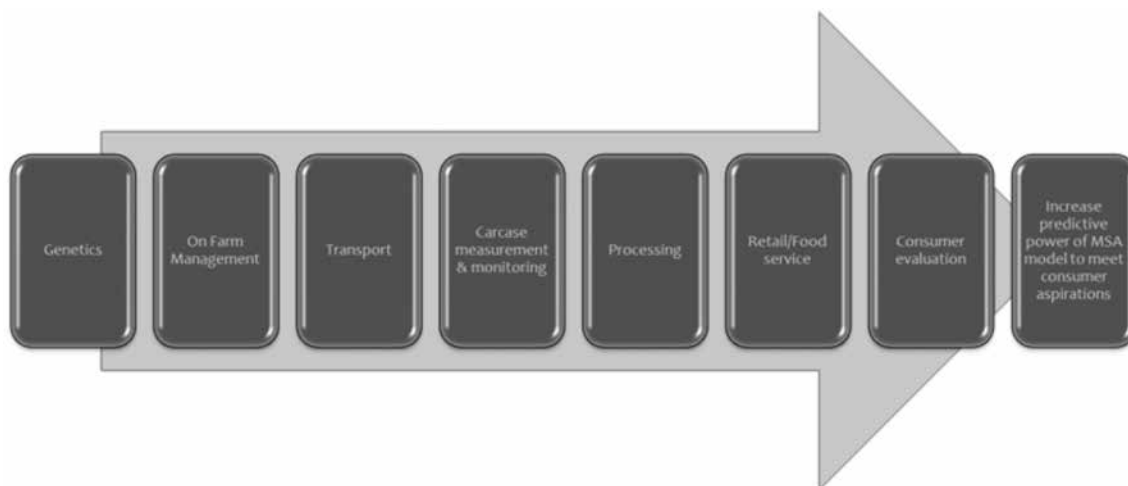


Figure 2. The Sheepmeat eating quality investment framework

Current Situation

The current eating quality grading program for sheepmeat (MSA – Meat Standards Australia) is based on science conducted by the Sheep Meat Eating Quality Program (SMEQ) and the first Sheep CRC, from 2001 to 2006. The research identified pathways and systems which underpin eating quality performance of lamb on a mob basis. Such research has led to a significant investment in technologies which improve eating quality, such as electrical stimulation, measurement of pH declines (potential hydrogen), consignment methods, a maximum time (48 hours) off feed and minimum growth rates required.

There are now 18 MSA licensed processing plants located across Australia which account for more than 5.4 million lambs (figure 3). Through intervention programs and quality management systems nearly 34% of the annual national lamb slaughter has benefitted from such eating quality improvements.

The current MSA program for sheepmeat is essentially a pass/fail carcase grading system, unlike the beef eating quality grading system whereby individual carcasses and primal cuts are graded using an individual animal specific predictive model. Additionally, feedback to producers is mob based and at best only average weight/fat data is provided, thus limiting information which can potentially assist with on-farm improvements.

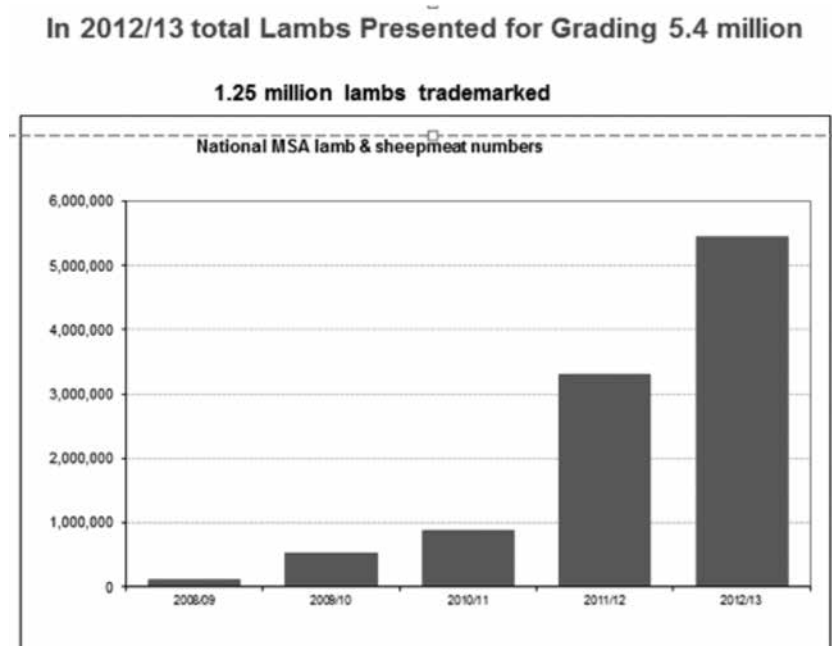


Figure 3. shows the rapid increase in MSA lamb and sheepmeat grading numbers from 2008 to 2014

Improving the current system

In 2011 the Sheep Industry Strategic Plan (SISP) identified that the next phase of MSA for lamb and sheepmeat would be the development of a process to allow the separation of lamb cuts based on consumer preferences. This process would be a significant improvement on the current pass/fail MSA grading and therefore would allow greater influence on defining eating quality for MSA of lamb and sheepmeat.

Over the last four years MLA, together with key R&D providers and the Sheep CRC, have run a series of consumer eating quality studies using animals from the industry's information nucleus research flock. Results indicate:

- Within the current MSA program of best practice management and processing there is still variation in consumer eating quality scores (up to 40 units for loin muscles).
- At a phenotypic level it is possible, through knowledge of breed type, HCWT (hot carcass weight), fat, EMD (eye muscle depth) and IMF (intra-muscular fat), that an MSA model may account for up to 70% of eating quality variance in both loin and topside grills and that this model may segregate cuts into MSA graded 4 star (better than everyday) and 5 star (premium) categories.
- At a genetic level it is possible to produce a breeding index using carcass and eating quality values which explain up to 65% of eating quality variance.
- Consumers are prepared to pay half the value if the product fails (2*) and 50% more if the product is 4* when compared to 3*. Consumer will also offer up to 100% more if the product is for 5* compared to 3* (Table 1).

Table 1: Willingness to pay – price relative to 3* (Sheep CRC and MLA consumer testing, 2010, based on 1,858 consumers).

	N	Ungraded	3*	4*	5*
Mean	1,858	49%	100%	147%	200%

Measurement is key to future eating quality improvement

There is an old saying "you cannot improve unless you measure it". The key to the development and implementation of a cuts-based grading model for sheepmeat is to obtain direct measurements of HCWT, fat, EMD, IMF and potentially retail/meat colour. There are technologies being developed and evaluated over the next six months which have the potential to measure the above mentioned parameters without human intervention. If successful, a cuts-based MSA system could be trialled as early as July 2015.

The success of the Sheep CRC rebid will also result in further exploration in a yearling sheepmeat category within the MSA program and the utilisation of heavier carcass weights, therefore allowing lamb producers to continue to aim for productivity improvements via heavier carcasses.

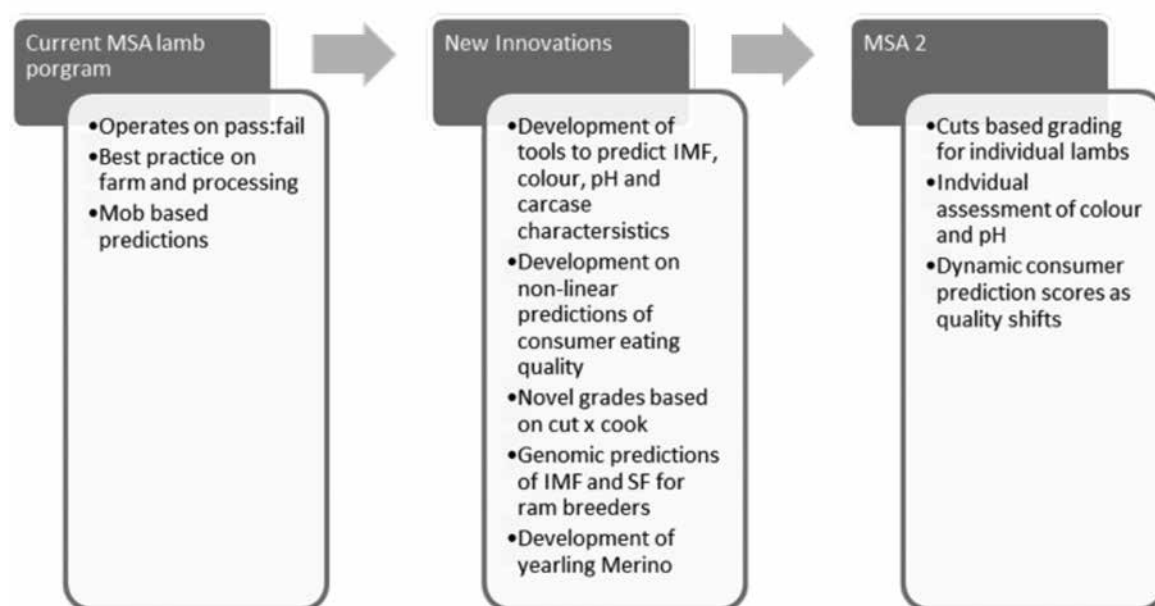


Figure 4. shows the activities and required outcomes to transition to a cuts based program for eating quality.

Managing Lean meat yield together with eating quality will drive consumer satisfaction and industry profitability

Satisfying consumer expectations for eating quality, and industry expectations for a profitable and sustainable future, is reliant on industry delivering more consistent high quality sheepmeat with an expanded range of carcasses and more efficient production. Underpinning all of this is the accurate prediction of carcase value based on lean meat yield (LMY) and eating quality. There is a significant challenge for the Australian sheep industry in that the correlation between LMY and eating quality is highly negative. Therefore as the industry strives for faster growing, leaner sheep with better muscle it is likely that eating quality will decline if measurement and grading systems such as MSA are not implemented.

To deliver accurate predictions the sheepmeat industry has an urgent need to modernise carcase grading systems with science-based technologies, which may include; value based marketing (VBM) payment systems (linked to LMY and eating quality) as well as national benchmarks of LMY and eating quality for the Australian lamb industry. Importantly amalgamating all aspects of a grading system, to deliver information back to the farm gate, will be a crucial step in ensuring industry's continuous improvement for consistently satisfied consumers and a vibrant innovative industry.

Embracing technology with a look at what's out there

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“Technology” it’s a bit of a buzz word that gets thrown about a lot. But what does it actually mean and how can technology save us time and make farm labour more efficient?

What is a “technology”?

Technology means more than gadgets and devices. Technology is all aspects of the application of new or improved scientific knowledge on farm. This means my favorite technologies are not restricted to machinery and devices, which certainly gave me plenty to choose from.

Why labour efficiency?

Labour is one of the biggest limitations to farm profitability. One of the key challenges of sourcing labour is being able to meet the seasonal peaks in labour demand. An inability to source sufficient labour to meet these peaks in labour demand could be costing producers as much as \$200,000 in lost profit (Thompson & Young, 2013). Seeking both permanent and casual staff is a challenge in the changing face of rural Australia. An alternative to be considered is how to use available labour more efficiently. Making tasks more enjoyable, less time-consuming and less arduous will also make them more attractive to seasonal and casual staff as well as to you and your family.

Over the last 6 years I have lost count of the number of yards I’ve worked in, the number of sheep I’ve seen and the number of kilometres I’ve driven. From these experiences, countless conversations in person and on social media and a good old fashioned literature search, I developed a shortlist of my 5 favourite pieces of lamb industry technology to save time and labour on farm. To make this list a technology had to show potential benefits across a range of sheep enterprises and production environments given the diversity of the Australian agricultural landscape. One of the biggest challenges in preparing this report was in quantifying the benefit of these technologies. To be included here a technology had to be tried and tested and “guaranteed” to save time and labour.

1. ASBVs (Australian Stud Breeding Values)

Sheep that are less work mean reduced labour requirements. Sheep that need less work can arise through selection on a number of different traits:

- Improved robustness and an ability to keep “doing” in tough times (Hall et al 2013)
- Plain-bodied sheep meaning reduced fly strike incidence
- Improved worm resistance meaning fewer drenches
- High growth rates in lambs resulting in earlier slaughter, meaning they spend less time on farm

ASBVs, Australian Stud Breeding Values, are a useful technology to utilize alongside visual selection to increase genetic progress in these areas. ASBVs provide the opportunity to compare the genetic potential of animals from different environments and are essential for making rapid genetic progress. Using ASBVs for the right traits can assist in identifying sires suitable for breeding easy-care sheep.

Numerous case studies have been conducted and an extensive review into the usefulness of ASBVs in commercial, stud and research flocks was conducted in 2012. They all found that ASBVs:

- Result in a more productive flock when used for ram selection
- Increase certainty of ram selection
- Benefit all production systems



Case Study: After several years of purchasing terminal rams with ASBV's, Mark Cooper saw the value they could add across his 7000 head Merino, Maternal and Terminal flocks. Enthused and equipped with new knowledge after attending a pilot Sheep Genetics course on ASBVs 2 years ago now all Merino, Border Leicester and White Suffolk rams purchased for his property in Edenhope, Victoria have ASBVs. Whilst it's still early days, Mark says he has been very pleased with the impact ASBVs have had on the farm to date and believes they are a useful tool in helping him breed more robust, resilient sheep that require less work. Through paying attention to the birth weight ASBV of Maternal and Terminal sires used, dystocia problems have been dramatically reduced resulting in a less labour intensive lambing season. The results of selecting rams with high ASBVs for early growth and muscle are also being seen, with Terminal sired lambs showing high growth rates and being finished earlier. Mark regularly monitors worm burdens on farm and is finding the first cross ewe progeny of the low WEC rams have lower WEC counts than the other mobs on farm so is confident he is moving in the right direction. For Mark, ASBVs are an important tool for smart farm management.

Case Study: For commercial and stud sheep producer Martin Oppenheimer, ASBVs have been a critical part of the tool kit in managing worms in his 11,000 sheep at Walcha, NSW. A combination of sound pasture and nutrient management coupled with using ASBVs to identify worm resistant animals in the stud and in selecting sires for the commercial flock has seen a dramatic decrease in the amount of time spent treating worms. Martin says, "34 years ago when I returned to the farm we drenched every month, now I'm doing 1 drench for the year. I'm saving time and money."

Martin has also seen the benefits of ASBVs from improved early growth rates and better resilience in the 2000 first cross lambs turned off each year. Despite the poor summer the New England experienced the 1st cross ewes lambs recorded their highest growth rates yet and left the property earlier and at higher weights than in previous years. Not only has labour been saved as the animals left the property earlier, paddock space is freed up sooner for other animals.

The opportunity to incorporate genomic information into ASBVs represents a new opportunity to further increase the value of ASBVs on farm. ASBVs are first on this list for the potential labour savings they can bring across a wide range of production environments.

2. & 3. Sheep handling machinery

Handling sheep is labour intensive, physically demanding and occurs many times throughout the year so it makes sense to invest in technologies which are applicable here. There are several different pieces of equipment on the market designed to:

- save time taken to complete tasks in in the yards
- reduce the number of people required to undertake tasks
- reduce the physicality of the tasks being undertaken

2. Auto drafter

The name explains itself; auto drafters draft sheep automatically, saving time and labour on farm. There are many models on the market with drafting capabilities ranging from 2-way to 9-way draft. Auto drafters are typically coupled with weigh bars to weigh and draft sheep efficiently. An auto drafter can usually be operated with 1 person and a good dog, a saving of at least one labour unit compared with manual drafting.

Animals can be weighed and drafted to:

- Monitor animal health
- Check pre-joining weights
- Select animals by weight for sale and slaughter
- To split mobs for supplementary feeding
- Additionally, animals can also be drafted on any trait which is recorded when EIDs are in use

Case Study: Anthony Shepherd of Sheepmatters works with both commercial and stud clients and believes one of the features of the auto drafter is the ability it gives to use information to make decisions. Anthony says using an auto drafter to draft on weight alone takes him and his dog around 1 second per sheep, whilst drafting on information stored on EID tags takes a little longer at around 3 seconds per sheep. Without an auto drafter, it would take 4 times as long to weigh and draft and require at least 1 additional staff member. Anthony says the time savings offered by the auto draft are enabling him and his clients to manage animals in ways they previously had not considered. A commercial feedlot client was able to save \$3200 just in grain costs through the use of EIDs and an auto drafter. By fitting 530 lambs with EID tags and running them over the auto drafter 3 times over 5 weeks, lambs making weight gains less than 150g/day were identified and removed. This saved \$3200 in grain costs, over the next 4 weeks of feeding as it identified the non-converters and got them out of the system!

Case study: Anna of Toland Merino says the addition of a 3-way auto drafter and weigh to their yards has had numerous benefits to their enterprise, reducing the time and the number of people required to undertake tasks and simplifying data management in the stud. Under their old system it would take up to 4 labour units one day to weigh 800 weaners and then 1 person half a day to enter the data onto a computer. Anna says, “I can weigh 800 sheep in roughly two hours with a good dog and just me!” As a stud utilizing EIDs, the other major benefit for Anna is the ability to draft on ANY criterion that she wishes utilizing the computer accompanying the drafter. “You can set up draft lists for ASBVs, certain weight ranges, sex, if you wish to see a group of progeny from a particular sire, anything really! This really appealed to me when considering what to buy.”

3. Sheep Handlers

Sheep handlers can assist with many tasks in the yards as they gently restrain and immobilize animals and in the case of some models, tip animals over too. With add-on modules for crutching, weighing and drafting also available they are a versatile addition to the farm. Table 2 highlights some of the tasks they can be used for. Handlers range from manually operated systems to fully pneumatic systems, the price generally increasing as the level of automation increases. Which model is best suited to an individual farm will depend on what it is being used for and whether the ability to tip the sheep over is required.

Table 2: Overview of the tasks that can be undertaken using a handler

Task	Immobilizer	Conveyor/ VE machine	Handler with tip capabilities
Drenching	Yes	Yes	Yes
Foot paring	Not usually	Possible with 2 people	Yes
Tagging	Yes	Yes	Yes
Vaccinating	Yes	Yes	Yes
Weighing	Yes	Not usually	Yes
Drafting	Yes	Not usually	Yes
Crutching	Bung hole	Not usually	Yes
Back lining	Yes	Yes	Yes
Hand jetting	Yes	Yes	Yes
Wigging	Yes	Yes	Yes
Capsule insertion	Yes	Yes	Yes
AI preparation	Yes	Yes	Yes
WEC sampling	Yes	Yes	Yes
Condition scoring	Yes	Yes	Yes

In simple terms, the key advantage handlers offer is a reduction in the physical exertion required to restrain sheep whilst a range of handling tasks are undertaken. As a number of jobs can be performed at once, time is saved and double handling of animals is avoided. As well as reducing exertion, handlers improve on farm OH&S, create a more enjoyable work environment and help reduce stock stress. The use of a handler when applying animal health treatments also helps avoid wastage as products can be more easily applied with the correct techniques and the risk of an individual getting a “double dose” or being missed is reduced.

Case study: For Poll Dorset Stud Breeder Richard Barber and his son Stuart, investing in an immobilizer 2 years ago was the next step to take in their business. The investment was made to reduce the physical demands of handling terminal breeds in the yards but also to improve on farm OH&S, data collection, sheep welfare and reduce animal stress. The choice of an immobilizer with a crutching module, 3-way draft and anti-backing ramp, as depicted in Figure 1, was made as it “represented the best compromise, doing a lot of jobs fairly well,” Stuart said. Also acknowledging that, “whilst the current set up allows them to weigh sheep, an auto draft and weigh system would be quicker if they just wanted to weigh animals.” Stuart said that it took around 2 minutes per sheep to drench, vaccinate, ring crutch and side brand the pregnant ewes, with the saving in time coming from spending less time physically handling the sheep and not double handling them. The handler is also used for all sheep weighing (except birthweight) and for ram scrotal circumference and assessment. The Barbers wish they had installed this equipment earlier and Stuart said, ‘It has changed how I feel at the end of a day in the yards’.

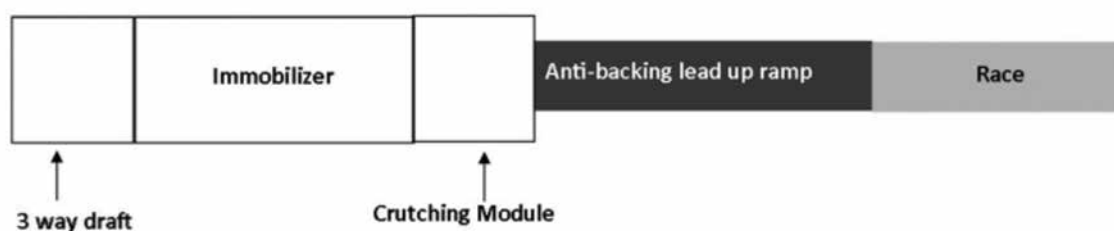


Figure 1. Overview of the Immobilizer with crutching module and 3 way draft in use by Richard Barber

Obviously the size of the operation and the duties that need to be undertaken will determine which particular brand and item of automated equipment are best suited to an individual farm. After doing the research, before investing in new machinery, consider spending a day working on someone else's farm actually using the equipment. Handlers and auto drafters have the potential to reduce labour requirements and the physicality of many tasks in the yards throughout the year and for this reason they make my top 5.

4. Smart Phones & Apps

The smart phone is perhaps one of the most underutilized pieces of technology at our disposal, not just on farm but in day to day life. The list of useful things smart phones can do is certainly extensive and there was no way to choose just one favourite 'app' or useful feature.

Although a decent internet connection is certainly required to unlock the full potential of smart phones, it is important to realize that the smart phone can still do a lot without the internet. Without the internet a smart phone is still a spirit level, ruler, torch, notepad, camera, video camera, compass, calculator, GPS and magnifying glass to name a few. If you are fortunate enough to be in an area with a mobile signal there are many other opportunities. Based in Armatree, NSW the Bradley family utilizes their phones on farm to check the weather, use farm banking apps and receive daily market update messages. The Smartphone is also a great way to keep an eye on what's happening with Auctions Plus, look up a rams figures in the paddock and of course instantly connect with agents, customers and suppliers via phone, email, Facebook, twitter, Linkedin, pinterest and more.

"Apps" are mini computer programs that can be downloaded onto mobile devices. The app space is constantly changing and keeping up to date with the latest apps available can be a challenge. Three apps suited to sheep enterprises that will appear soon are AWI's app version of the Lifetime Ewe Management Program, iHerd and Farmware. iHerd is an app for recording mob based stock movements, a measurement converter and an electronic tally whilst Farmware is a more comprehensive farm management app. Several state rural fire services also have free apps which provide bushfire alerts and updates. Another exciting area of development is mobile (and radio) telemetry for remote monitoring of watering points, electric fencing, electric usage and more. Producer Elke Hocking says she is enjoying the flexibility of being able to remotely control the farm's irrigation. She says she can be on the beach in summer and use her phone to switch the centre pivot irrigation on and off!

The ways which smart phones can be used on farm to save time and labour are numerous. How are you going to use your phone "smarter" in the future?

5. The Working Dog

With all the technologies on the market and coming through the pipeline, I still cannot go past one of the oldest tools around to dramatically reduce human labour requirements on farm, the working dog. For this reason and the exciting research currently being funded by MLA at Sydney University dogs have made this list. Increasing the efficiency of mustering through reducing the amount of time or human labour required has a high payoff in most sheep production areas (Thompson & Young, 2013) so it's not a surprise that a good dog is a valued contribution on farm. However, until very recently the contribution of a working dog over its lifetime had not been quantified.

In 2013 the Farm Dog survey collected detailed information from 812 producers about 4,027 dogs including the costs associated with working dogs and an estimation of the work they typically perform (Arnott *et al.* 2014). It was estimated that work a dog contributes over its lifetime is valued at \$40,000, representing a 5.2 fold return on investment (Arnott *et al.* 2014). If the median dog value is \$40,000 just how much is a good dog worth?

A lifetime value of \$40,000 is likely to be a conservative estimate as the estimate only places a value on dog labour during peak work periods (such as shearing, drenching, crutching) and does not factor other expenses such as vehicles, fuel and insurance associated with human labour. It also does not account for the valuable tasks dogs perform that people can't.

Further research in this area seeks to identify the genetics underpinning desirable working dog traits and how these traits can be measured on farm. Who knows before too long we could be seeing dogs sold with breeding values! For the large return on investment they provide and considerable saving in human labour they represent the working dog made this top 5 list.

The technology of the future!

Further time and labour savings are likely to come from the stuff that is still to be commercialized or is currently too costly to be practical. Leaps and bounds in computer capabilities in recent years means that stuff we could never dream of 10 years ago is just around the corner. Currently in the research phase are all kinds of things from:

- Ear tags that monitor animal health and send updates to phones and computers
- Rumen sensors that measure feed conversion efficiency and methane outputs
- Drones that round up stock
- Daily remote pasture monitoring on a paddock by paddock scale
- Non-invasive technologies to predict the eating quality of lamb in real time in abattoirs.

There are also plenty of fantastic on farm inventions with potential to be commercialized so it will be exciting to see what new technologies appear in the next 10 years.

Conclusion

Sheep often come with the stigma that they are “hardwork,” however there are technologies available to not only save time and labour on farm but to make tasks more enjoyable. Presented here are 5 that have applications across a range of sheep enterprises in Australia. This is by no means an exhaustive list and often on farm technologies are synergistic – the adoption of more than one is greater than the sum of the parts.

Learning how to use a new technology can be daunting and new skills do not magically develop overnight. As someone who has had to learn a lot of new skills and technologies since my relocation to the country, I can say from first hand experience that it takes time and can feel awkward. However I have also learnt that there is plenty of support out there, whether like me you are just starting out or if you have a few years of experience under your belt. A new technology is only useful if the people behind the controls understand what they are doing.

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On-Farm use of sheep electronic identification

Nathan Scott

Livestock Production Consultant, Mike Stephens and Associates

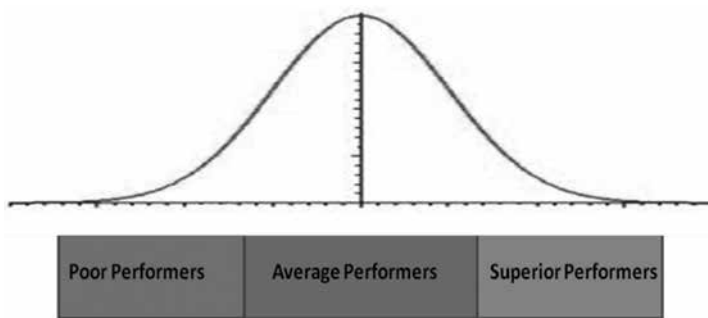
What is it?

Electronic Identification introduces new opportunities for sophisticated individual animal management at farm level. In the Australian sheep industry, traditionally all data collection and animal management occurs on a mob by mob basis. Through the use of Radio Frequency Identification (RFID) tags, animals can be monitored, and managed individually throughout their life.

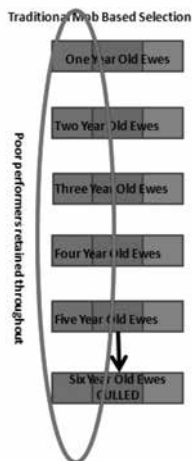


Individual Animal Management

Within any flock, there is considerable genetic and phenotypic variation. It is through this natural variation that individual selection of superior animals allows more rapid improvement in the productivity and profitability of a commercial flock.



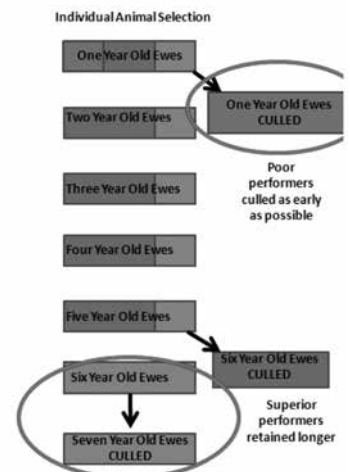
Example of the distribution of animal performance within a flock for a given trait



Under traditional mob-based management (left), much of this variation remains within the flock throughout their time on the property.

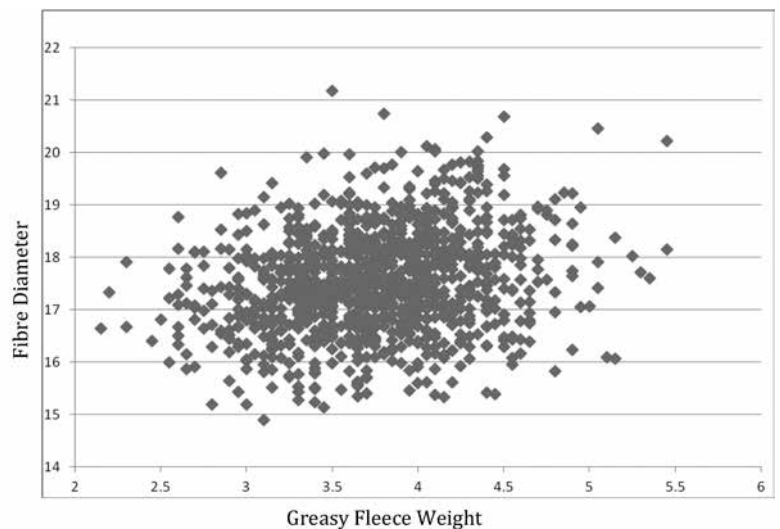
The use of individual animal management (right) is designed to maximize returns from the most productive animals within the flock, whilst minimizing the cost incurred from the least productive.

Electronic identification is not a silver bullet, it simply makes all the necessary data collection, more accurate, more labour efficient, easier, and therefore more likely to occur.



Measurement Based Selection & Management

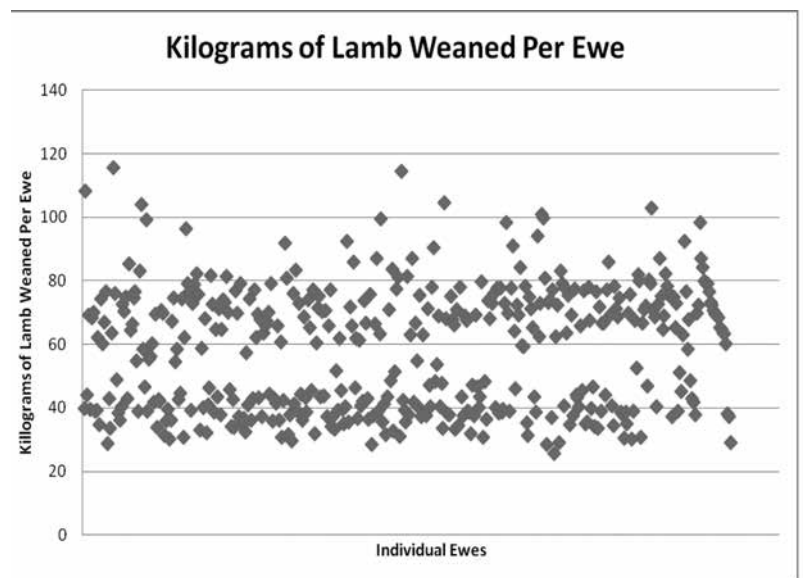
Wool Producers: Electronic identification makes the collection of individual fleece data such as micron and fleece weight more accurate and more efficient. Most importantly, it makes the use of this data for animal selection and culling significantly easier. You can rank your flock on fleece value, cull the worst performers, and capitalise on the most profitable sheep. Not only that, but you can combine this information with reproductive performance to discover the animals delivering real profitability to your business. No more passengers!



Example of fleece data collected for a commercial merino flock

Prime Lamb Producers: How valuable would it be to know which ewes within your prime lamb enterprise produce the most kilograms of lamb each year? Perhaps more importantly, how valuable would it be to know which ewes produce the least? This can be easily achieved with an EID system.

Pedigree MatchMaker (PMM) is a walk by system that uses RFID tags to estimate associations between ewes and their lambs, and provide the ability to trace individual animal pedigree (see attached factsheet for more details). Through the use of Pedigree MatchMaker and recording individual weaning weights, a ewe flock can be ranked based on the kilograms of lamb she has weaned. This allows the producer to rank the flock based on kilograms weaned, culling the worst performers, and capitalising on the most profitable sheep. No more passengers! (See attached info sheet).



Example of kilograms of lamb weaned per ewe within a commercial ewe flock

Other EID Tasks

1. Simple Stocktake

Exactly how many sheep are on your property right now?

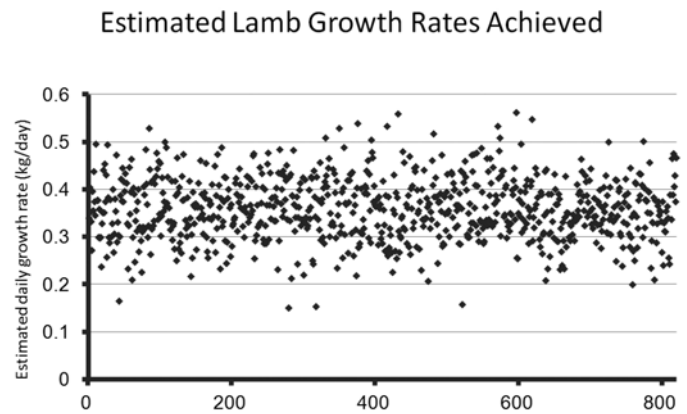
- Which have received a treatment within the last month?
- What sheep did you sell in the last 6 months?

If you are interested in having a more accurate handle on this type of information, then EID may provide the answers. The most basic EID systems can help you through counting and recording stock whenever handled, together with any treatments that they may receive.

2. Individual Weight Recording

- How much variation is there in growth rates?
- How much variation is there in the weight gain or loss of your ewes on a “maintenance ration”?

EID allows you to track individual growth rates rather than just the mob average. Weighing is a task that you already undertake; EID makes the information even more useful.



Example of individual lamb growth rates within a commercial flock

Record Anything

With an EID system you can record anything that can be measured objectively or subjectively. That said however there are four key points in deciding what to record for your sheep enterprise –

- Only record data that will add value to the enterprise
- Always keep data collection tasks as simple as possible.
- There is no point in collecting data unless you will actually use it.
- The more data you collect, the harder it is to manage



Plan Your System

The EID system that will suit your enterprise may be very different to that of your neighbours, or the one that someone is trying to sell you. For many producers, the use of a contractor to undertake major and or irregular tasks will be a much better investment than purchasing equipment which will sit unused for 11 months of the year. Knowing your needs, and understanding the various equipment components will ensure that your system is efficient, and cost effective.

What Electronic Identification isn't

EID doesn't mean an auto-drafter. Auto-drafters are a wonderful tool, but they are not EID, and are not always necessary. Almost anything can be achieved with a handheld reader, and a manual weigh-crate. Auto-drafters simply make some jobs quicker and more labour efficient.

EID isn't about owning lots of fancy toys. In fact you don't have to own any equipment at all. Contractors can undertake all of the major tasks on farm, eliminating the need to own, and understand any equipment. Some producers are already doing this. The only difference to the work that they undertake themselves is the type of tag applied at marking.

EID doesn't have to be expensive. The amount you spend on your EID system will depend entirely on your desired outcomes, your enterprise type, enterprise size and need for efficient operations. EID systems do not have to be expensive.

- **Know what you want from EID**
- **Know what you need from EID**
- **Only spend the money needed to achieve these outcomes.**

A guide to the use of Pedigree MatchMaker

Pedigree MatchMaker (PMM) is a walk by system that uses RFID tags to estimate associations between ewes and their lambs, providing the ability to trace individual pedigrees.

The concept requires both ewes and lambs to carry an RFID tag and uses an attractant such as water or grain to entice animals to walk single file through a narrow entrance to a fenced area. On the way through the entrance all tags are recorded.

Given the natural tendency of lambs to follow closely behind their mother (see figure 1), the Sheep CRC has developed software designed to predict the association between ewe and dam.



Figure 1: Ewe passing through the single file entrance, with lambs following closely behind.

Equipment required

RFID tags to be applied to all ewes and lambs within the flock

- Panel Reader/s
- Data Logger/Indicator for tag recording
- Power Source – 12v batteries (solar panels optional)
- Attractant - Water, Loose Licks, Mineral Blocks, Feeder (grain)
- Temporary Fencing Panels – Single entrance to be 1200mm long by max 600mm wide



Figure 2: Panel set up ready to record. Note the simple entrance setup.

Method:

1. Expose ewes to single entry point system around attractants wherever possible leading up to, or throughout lambing. This will help ewes become accustomed to the equipment and reduce the fear of walking through the single file entrance. Temporary fence panels should be introduced gradually. Better results will be achieved where ewes can be exposed to the PMM setup prior to lambing.
2. Ensure that all ewes have electronic tags prior to lambing.
3. Apply electronic tags to all offspring at lamb marking. Lambs follow their mother more closely at a younger age, so better results are likely where recording can begin with lambs at a young age
4. Place self-feeders or other attractant in corner of the paddock (figure 4), and progressively fence off to a single entry point over time. The more time that animals can be exposed to the equipment prior to recording, the better the result is likely to be.
5. Add panel reader and data logger and begin recording results. Introduce data capture equipment, batteries etc. as early as possible to allow all sheep to investigate over time.
6. Change Battery daily, or as often as required
7. Download data at regular intervals (weekly)
8. Collect data for 4-6 weeks.
9. Have data analysed by an accredited Pedigree MatchMaker analyst.



Figure 3: Simple set up. Steel posts and timber rails are a simple effective entrance to PMM set up.



Figure 4: Grain feeders used as attractant. Note the obvious signs of traffic through entrance to fenced area and around feeder.

Tips for success

- Sheep flow is critical to success. Training of sheep to walk through is vital. The ultimate aim is to get sheep walking of their own volition single file past a panel to record RFID tag numbers. You do not need an elaborate setup; all you need is sheep flow.
- Start training ewes as early, and for as long as possible
- Every paddock and every flock will present a different set of variables that must be overcome to achieve effective sheep flow and data collection.
- If possible, turn off all sounds produced by the RFID reader, as “beeps” introduce an additional stimulus which can impact upon sheep movement.
- Always protect all wiring and equipment with additional fence panels as invariably sheep will chew them.
- If in doubt, record more data.



A guide to Litter Weight Weaned

as selection criteria within a commercial sheep flock

Electronic Identification makes it possible for sheep producers to measure the actual performance of an individual ewe in terms of lamb production. Pregnancy scanning data provides an indication of the potential lamb production from a ewe, however many factors influence the actual production achieved due to lamb mortality and variations in lamb growth rates.

Measuring Litterweight Weaned (LWW) is not a new concept, however in the past it has been restricted to use within the stud sector simply due to the labour involved in recording the pedigree information required.



The Science – Composite trait selection to improve reproduction and ewe productivity: a review

G. D. Snowden A, N. M. Fogarty B C

Animal Production Science 49(1) 9–16 5 January 2009

“Selection for an overall composite trait of ewe productivity, defined as litter weight weaned per ewe joined, can result in a balanced biological composite trait with favourable responses in component traits including fertility, number of lambs born, lamb survival, lactation and lamb growth. Selection for litter weight weaned may also overcome adverse genetic relationships among reproductive component traits.

It is concluded that selection to improve reproductive efficiency and ewe productivity, under most production and environmental systems, would benefit from selection for a composite trait such as litter weight weaned, rather than for a single component trait.”

Practical use of LWW in a commercial flock

The use of Electronic ID (EID) tags make it possible to assess the performance of an individual ewe based upon LWW in a low cost, low labour manner.

All ewes and lambs in a mob are tagged with EID tags and a process known as Pedigree Matchmaker used to establish which lambs belong to each ewe. Pedigree Match Maker (PMM) is a walk by system that uses EID tags to estimate associations between ewes and their lambs, and provide the ability to trace individual animal pedigree. See additional factsheet attached for more information and tips on how to implement PMM.

With pedigree known for each lamb, it is then a simple process of recording individual liveweights for each lamb using EID at approximately 100 days of age. Mike Stephens & Associates have developed a program which takes this data and calculates the kilograms of lamb produced by each ewe and ranks them. The result is a relative ranking of ewes within the mob, based upon the kilograms of lamb that each has weaned.

Demonstration Property Results

Mike Stephens & Associates have conducted a number of litter weight weaned demonstration activities in recent years. These have identified enormous variation in the level of production achieved in relation to litter weight weaned per ewe. This variation simply cannot be identified without the knowledge of lamb pedigree, and recording of individual weaning weights.

HM Prison Langi Kal Kal Demonstration

The ewes in the mob were all scanned as multiple bearing, demonstrating their potential. All ewes were in condition score 3 or better, and feed quantity and quality in the paddock used were excellent with approximately 2000kg/ha of Phalaris and Clover.

The most productive ewe in the mob reared a phenomenal 139.5kg of lamb (lambs at average age of 113 days). She reared 3 lambs with weights of 45kg, 45.5kg, and 49kg. The most efficient ewe in the mob weighed in at 73kg and reared 121.5kg of lamb. That is equivalent to 166% of her body weight reared in lamb weight. A number of ewes only reared a single lamb with weights ranging from 42-50kg.

Shelburn Demonstration

A mob of six hundred first cross ewes were used in the demonstration. The LWW recorded for ewes with lambs at an average age of 85 days ranged from 21.5kg to 115kg. The highest growth rates (based on assumed average birth date of one week into lambing period and birth weight of 6kg for all lambs irrespective of rearing type) achieved was 560g/day up until day 85.

The highest three average growth rates achieved were all in excess of 540g/day. Of these three lambs, one was reared as a single, two as a twin. Twin and triplet lambs were found to be regularly out performing some single lambs based on average growth rates throughout the 85 day period.

Litter Weight Weaned will now form the basis of ewe selection within the maternal flock at Shelburn.



Applications of genetic technology in breeding better beef cattle

Tom Gubbins

Te Mania Angus, Victoria

Background

Te Mania Angus is built on a gene pool already 85 years in the making. It provides Angus bulls, semen, embryos, elite stud cows, ET recipients and commercial females for the premium beef industry.

The Te Mania Angus philosophy is to breed sound, quiet, highly fertile cattle with calving ease, high growth rates and exceptional carcase quality which will enable its clients to meet strict market specifications and optimise value.

With national and international markets, Te Mania Angus is backed by Team Te Mania, a coalition of 40+ beef cattle herds across SA, Victoria and NSW for progeny testing its cutting-edge genetics and fast-tracking commercial production.

Te Mania Angus holds two annual bull sales - one on-property at the Mortlake, Victoria, headquarters each autumn, and one at Walgett, NSW, each spring. Semen is retailed through AI resellers.

The Mortlake property is 2,600 hectare, with an annual rainfall of 610 mm. There are 3,500 head on the property, with cattle running in large contemporary groups to achieve more effective progeny data which can then be compared in one environment.

The Te Mania Angus herd has been performance recording since the early 1950's and was one of the founding herds to join Breedplan in 1971. Today, performance recording is the backbone of the breeding strategy and management program at Te Mania Angus.

Performance Recording

Australia's sheep industry must demand more from its seedstock sector when it comes to the application of genetic technology.

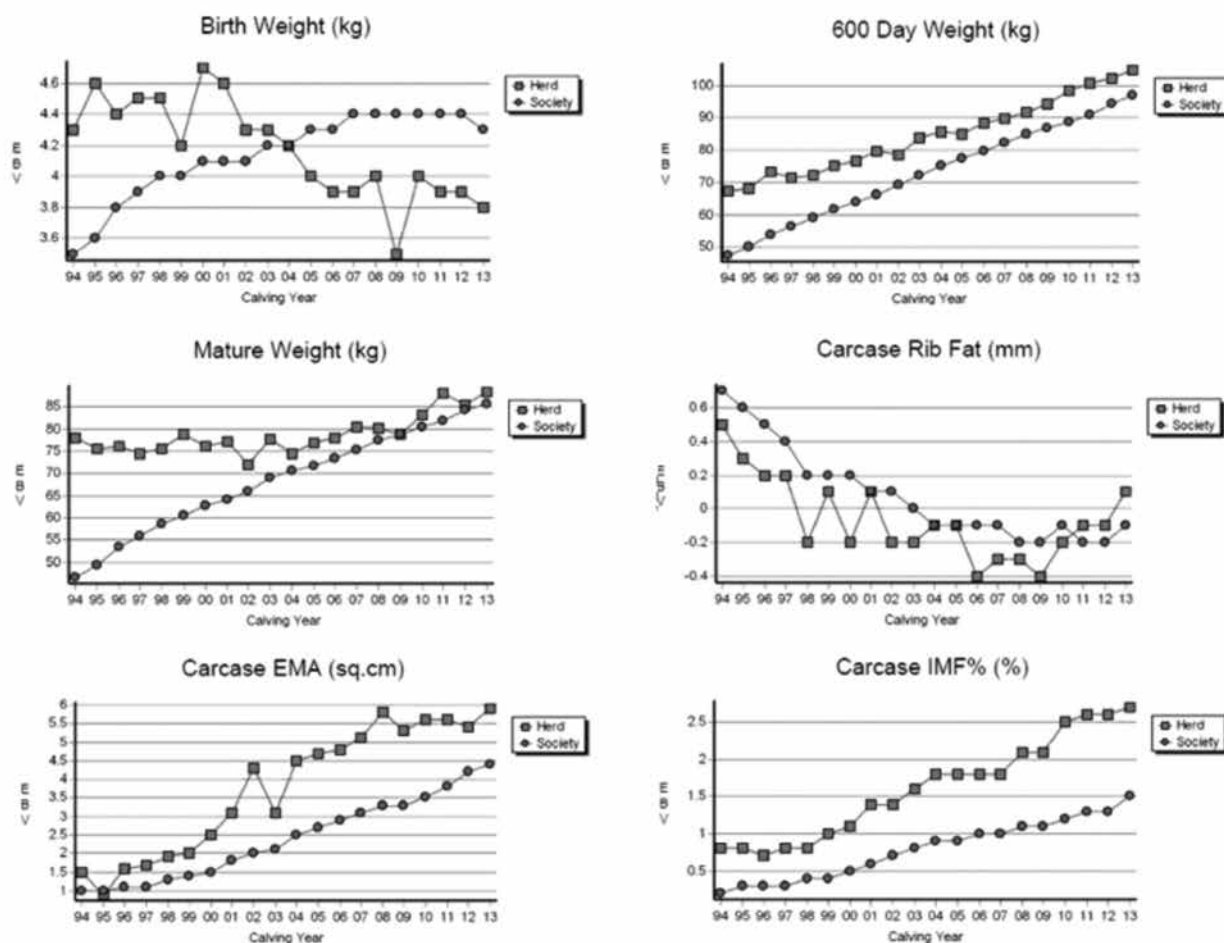
The pig and chicken industries have made significant genetic gain in the past 50 years. For example in litter sizes in the pig industry and weights gains in both industries. On the other hand, the sheep and beef industries have lagged behind in the adoption of the very technologies which made this happen (EBVs). Consumer demand for pork and chicken has risen at the same time at the expense of beef and lamb.

Objective measurements have made a huge difference to the genetic gain of the Te Mania Angus herd. * see graphs below

Herd: VTM - TE MANIA

Angus Australia

May 2014 Angus Australia BREEDPLAN
Graphs of Herd Compared with Breed Genetic Trends



With the use of performance recording, Te Mania Angus has dominated the breed's EBVs for many years -with more than twice as many Angus Group Breedplan trait leaders as any other stud.

There is still some confusion between phenotype and genotypes of animals out in the industry, which is holding back progress in both the cattle and sheep industries.

One of the core problems within the industry is that many commercial breeders are happier to choose their breeding stock by eye – subjectively, rather than using performance information to help make these decisions objectively.

Seedstock suppliers need to offer these traits and work closely with their commercial clients to improve the acceptance of performance data.

There is a huge amount of information and research which has been done, literally tens of millions of dollars has been spent on genetic tools for the beef and lamb industry but there is a real problem with their uptake. The tools are sitting in the cupboards at Meat and Livestock Australia and other research institutions.

Team Te Mania

A recent focus area of Te Mania Angus has been developing relationships with processors to obtain carcass feedback on progeny in their Team Te Mania program.

Team Te Mania was formed in 1995. It is a national alliance of 41 progressive commercial beef producers who are testing and utilising the best practices in beef production and sharing the latest genetics from the same performance-based gene pool.

Team members lease their bulls from Te Mania Angus and obtain semen at cost price.

Last month Team Te Mania submitted 3000 carcass records to Angus Group BREEDPLAN, the largest single entry since the Beef CRCI in the early 1990's.

A further 700 records will be added this month.

It is understandable that there is a reluctance by processors to make carcass feedback available due to its commercial sensitivity, but it is invaluable to breeding higher quality animals.

The sheep seedstock industry needs to push to obtain similar valuable feedback.

Stud breeding is really about identifying economic traits and then working on a genetic solution to enhance them. You need to define it, collect it and select it to improve the genetic merit of these animals.

The relationship between cost of production and consumer demand is very high so the more efficient we become and better our product is, the larger the market and the more profitable we all become.

When we trade our product on the world market the product will be better and cheaper than our overseas competitors.

The fruits of change

John Ramsay

Ramsay Agriculture, Bothwell, Tasmania

Ramsay Agriculture has undergone a lot of change in the last 13 years. In the last year our changes have been as part of the MLA Challenge, a competition for red meat producers to improve their business.

Ramsay Agriculture's story is similar to many farmers across Australia. Some challenges are generic and others are individual.

Ramsay Agriculture comprises 3 farms 'Ratho' in Bothwell, 'Tarella' at Dysart (30 minutes south from Bothwell) and 'Umtali' at Bridport, 3 hours away in the North East. 'Tarella' runs 3000 merino ewes joined to a white Suffolk and 40ha poppies under gun irrigation. 'Umtali' joins 4500 composite ewes to composites and breeds surplus ewes for 'Ratho'. Lambs are transferred to 'Ratho' to fatten, depending on feed availability.

This year at 'Ratho' we will grow 180 ha of poppies, 22ha of clover seed and have joined 5000 ewes. We hope to trade 300 head of yearling cattle and finish 8000 lambs.

When I came home from Orange Agricultural College in 2001 to 'Ratho', of which 70% we had been leasing for 17 years from family. Everyone else around was doing pivots and poppies and my return from college was the impetus for change to buy the farm at auction so as we could develop it as the rest of the valley was. Credit goes to my parents who were very supportive of this change.

So in 2001 we bought 'Ratho', put in the first linear and grew our first decent amount of poppies (55ha). At this time Ramsay Agriculture leased 'Umtali' from my parents in the North East of Tasmania. It was running 1000 ewes, 100 cows and 2000 wethers (5,000 DSE). During the 90's my father embraced a low cost farming system (and leasing property) had led to both properties being fairly underdeveloped.

On return from college we set about improving both farms. At 'Umtali' we have renovated 70% of the area to improve the pasture types and improved fencing and infrastructure and are now running 4,500 composite ewes (10,000 DSE). 'Ratho' we have added a pivot every 3 years and now have 522 ha of irrigable ground growing 180 ha of poppies, we have also built a 400 ML dam. This year we have joined 5,000 composite ewes. Over 50% of 'Ratho' is irrigable now.

In 2008 we purchased 'Tarella' as real estate play. It is half an hour away from Bothwell and only 40 minutes from Hobart. When we bought 'Tarella', we were in a drought. When we started to come out of the drought we decided to dryland crop cereals. Sheep were expensive to buy and grain price was high. It seemed like a 'no brainer' decision. At this stage we were running 1000 merino ewes at 'Ratho' 1000 merino ewes at 'Tarella' and 2,000 merino's and 2000 composites at 'Umtali'. We were cropping over 700 ha of poppies and cereals.

In the last 3 years we have scaled back our cropping in order to grow better poppies this is when we entered the MLA challenge to really hone in on our grazing side of the business.

My father benchmarked, and we have been benchmarking the whole way through. I have been analysing the results for this talk and the main changes in benchmarking has been.

Our equity levels are at the same point we were at in 2001, it increased after land values rised in the 2000's and then dropped after we bought 'Tarella', but overall we are at the same debt to asset % as when we started.

Long term changes to the business

- We have had 15 different enterprises 7 livestock and 8 different crops
- Our labour efficiency hasn't increased a lot in livestock (7,000 DSE /fte -7500 /fte)
- Gross product per FTE has gone from 175,000 per fte to 290,000 per fte
- Our return on assets has ebbed and flowed from 2 to 10%, but we are not finishing at that!
- Our turnover has gone from \$683,000 to \$2.7 million.
- Our net worth has increased by 430% over 14 years, 30% ROE (roughly)



Why the Challenge

Ramsay Agriculture was going well. Then the rains returned and our fragile cropping ground couldn't sustain the intensive rotation of poppies and cereals. We sought advice and through a program funded by 'caring for our country' the 'gurus' said give the ground a rest with ryegrass.

We tried ryegrass for one year and we didn't manage the feed resource well and our stock class that we were utilising the grass with was also not suited.

Enter the MLA challenge we were encouraged to apply by our local Woolworths buyer. The challenge offered support through mentoring, tools and resources and farm advisors.

The Mentor

As part of the MLA challenge we have been given a mentor, we could choose our mentor and I suggested John Keillor. We had involvement with John before and liked the way he thought. He had a good grasp of sheep systems, he understood finances and we got on well. At the challenge opening in Sydney John K and John R set to work redesigning our business, focusing on the sheep enterprise. I had a paradigm that our country was 'fattening' country and with the lack of shelter breeding wasn't an option. I also believed that fattening was more profitable than breeding. John challenged us from the outset and suggested that profit is about kg of lamb per hectare at a price. What is the price differential between store lambs and finishing lambs when we sell in Tasmania?

We set to work and realised that in there was very little price difference between store and fattening over the past 5 years.

We were still dubious about breeding in our country, pivots and linears means no shelter and exposure issues for little lambs. John came and had a look at believed there were plenty of areas in Australia with similar exposure issues and the keys to maximising lambing percent (a key profit driver) is time of lambing, feed on hand and size of lamb born. He made the point that long grass in these areas would offer shelter to the lambs.

Feed on offer will mean the ewes need to travel less for feed, so less mismothering, feed on offer can also give shelter to a little lamb and will mean the lamb is in better condition to survive poor weather events. We decided to lamb at the start of September as the Feed on offer should be good then. The Feed demand calculator suggests this.

Crossbred sheep were the solution to having good sized lambs. A bigger ewe can manage to produce a bigger lamb. Genetics for cross breeds produce bigger lambs and selecting higher birth weight ASBV's (Australian Sheep Breeding Values) will also produce bigger lambs. We don't want to go too big otherwise we will be having birthing issues. We will need to fine tune this as we go.

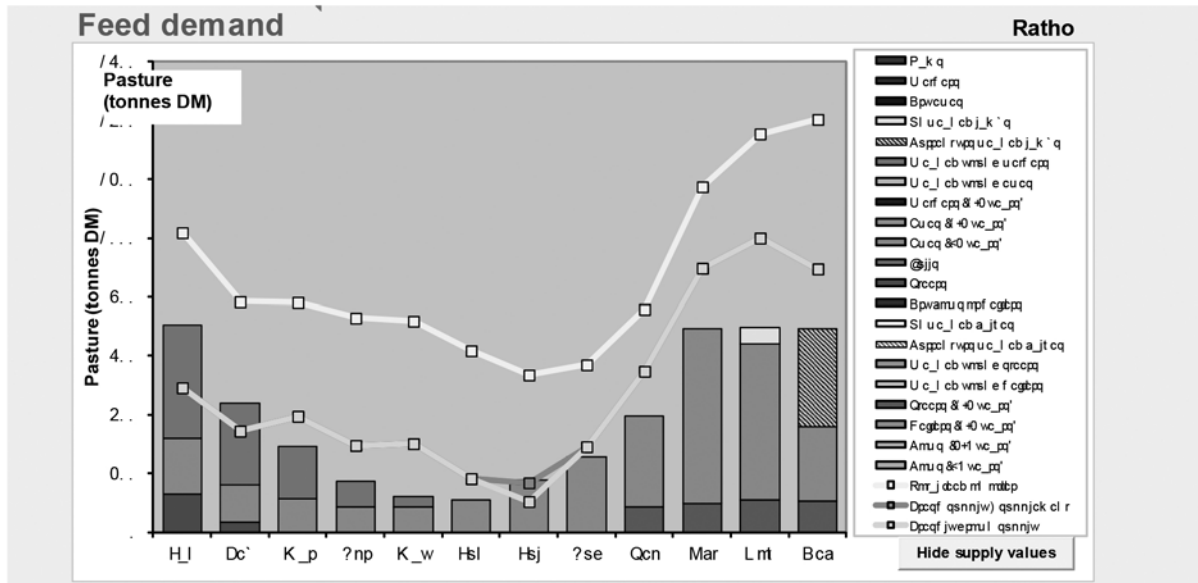
The feed demand calculator

This is a tool developed by the MLA for whole of the year feed budgeting. It is an excellent tool that helped our decision making process. In the tool you enter your class of land (pasture types, irrigated?) and the pasture growth rates they produce.

Month	Irri summer Per ryegrass, clover - Good		irri autumn Per ryegrass, clover - Good		hills Annual grass, clover - Poor		Wheat stubble Forage crop		fodder rape Forage crop		pastu dryland Per ryegrass, clover - Poor		Average	
	Growth	Quality	Growth	Quality	Growth	Quality	Growth	Quality	Growth	Quality	Growth	Quality	Growth	Quality
Jan	20	10.8	20	10.8	5	9.9	0	11.6	100	11.6	7	10.3	21	11.1
Feb	40	10.4	19	10.4	5	9.3	0	11.6	30	11.6	5	9.8	16	10.5
Mar	35	10.4	34	10.4	5	9.4	40	11.6	30	11.6	5	9.4	17	10.5
Apr	20	11.1	20	11.1	5	10.1	40	11.6	30	11.6	8	10.5	13	11.0
May	20	11.3	20	11.3	5	10.2	0	11.6	30	11.6	7	10.7	13	11.1
Jun	15	11.3	15	11.3	4	10.3	65	11.6	6	11.6	6	10.6	8	11.0
Jul	10	11.1	10	11.1	1	9.7	65	11.6	3	11.6	4	10.6	4	10.9
Aug	25	11.0	25	11.0	5	9.1	65	11.6	12	11.6	8	10.8	12	10.7
Sep	39	11.3	39	11.3	23	9.7	65	11.6	0	11.6	16	11.3	27	10.7
Oct	65	11.5	46	11.5	34	10.7	0	11.6	0	11.6	35	11.5	42	11.2
Nov	60	11.4	38	11.4	47	9.9	0	11.6	0	11.6	47	11.1	49	10.7
Dec	52	11.0	30	11.0	20	9.5	0	11.6	100	11.6	26	10.4	37	10.8

You enter in your stock and then determine how well it correlates.

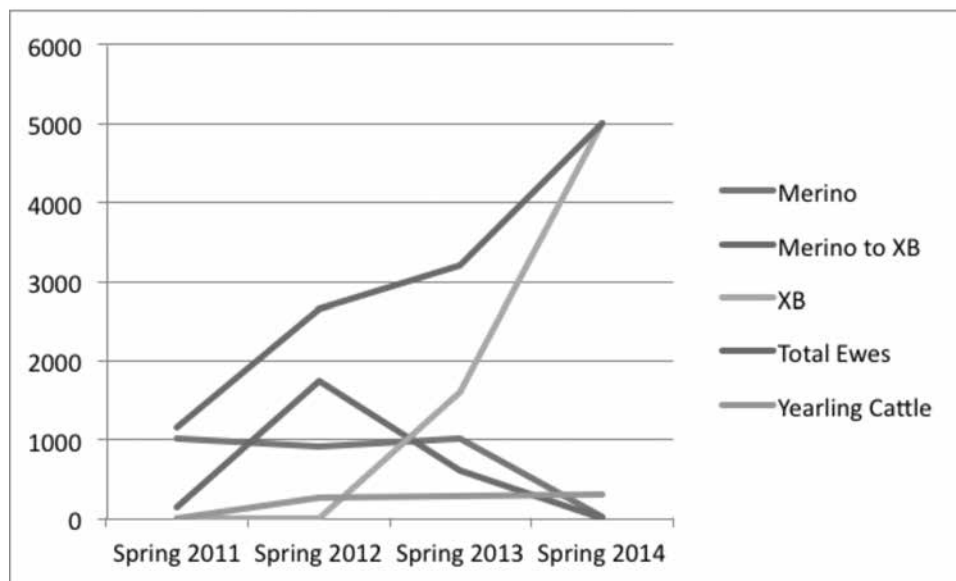
This graph is this year with 5000 ewes and purchasing 300 head of cattle and selling 8000 lambs throughout the year.



Changes to Ratho through the last 3 years

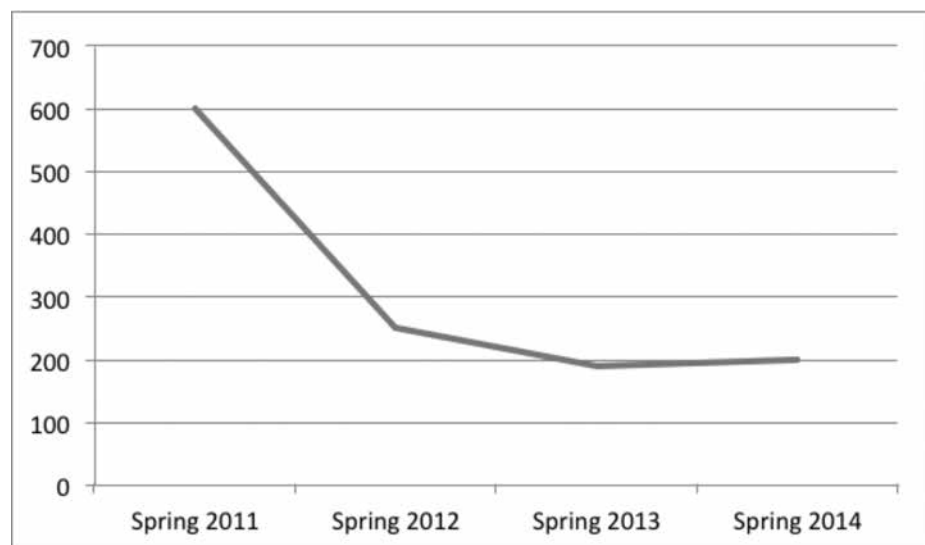
On Farm Ewe Numbers

As cereal cropping moved out of our system ewes moved in. However we totally under budgeted how much short term ryegrasses would produce in the spring, thus we have increased our ewe numbers to utilise the spring growth. Crossbred ewes are taking over from the merinos as they are more suited to the conditions.



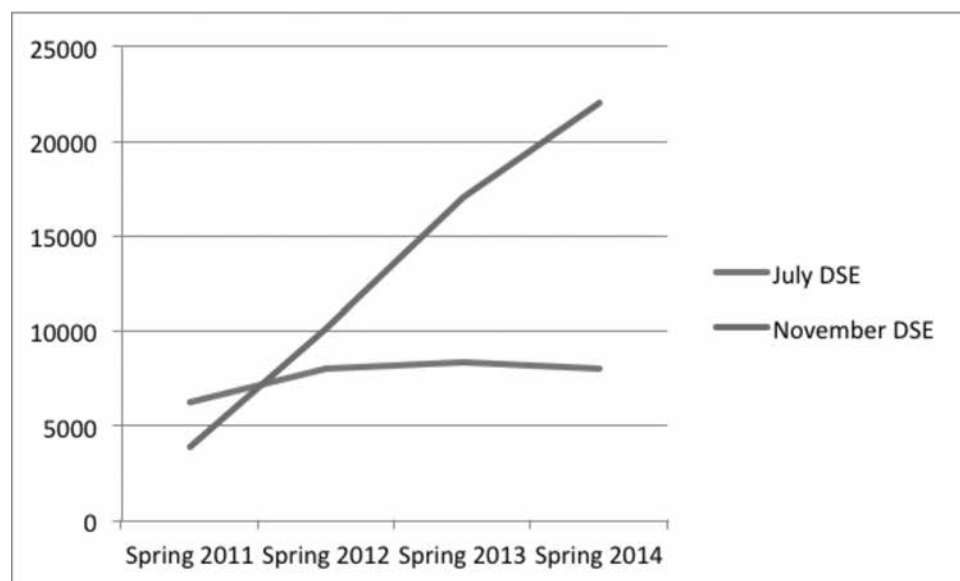
Crop Area

When we came out of the 2008-09 drought with grain prices high and stock expensive to replace we chased grain. This worked but eventually it bit us in the bum. Since harvest of 2012 we have cut back on cereals and poppies.



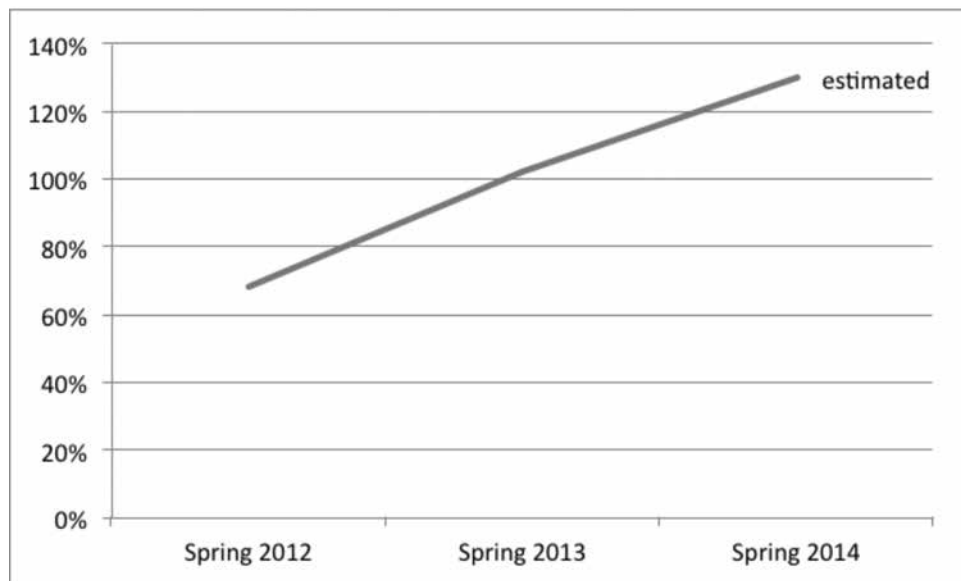
Spring stocking rate vs winter

Merino Ewe averages 1.25 in July and a crossbred 1.6. Merino Ewe averages 2.5 in July and crossbred DSE by 400% through changing from running lambs through winter to running ewes. Our July DSE hasn't increased much in the last 3 years. We could keep our winter stocking rates in the past with grazing cereal crops.



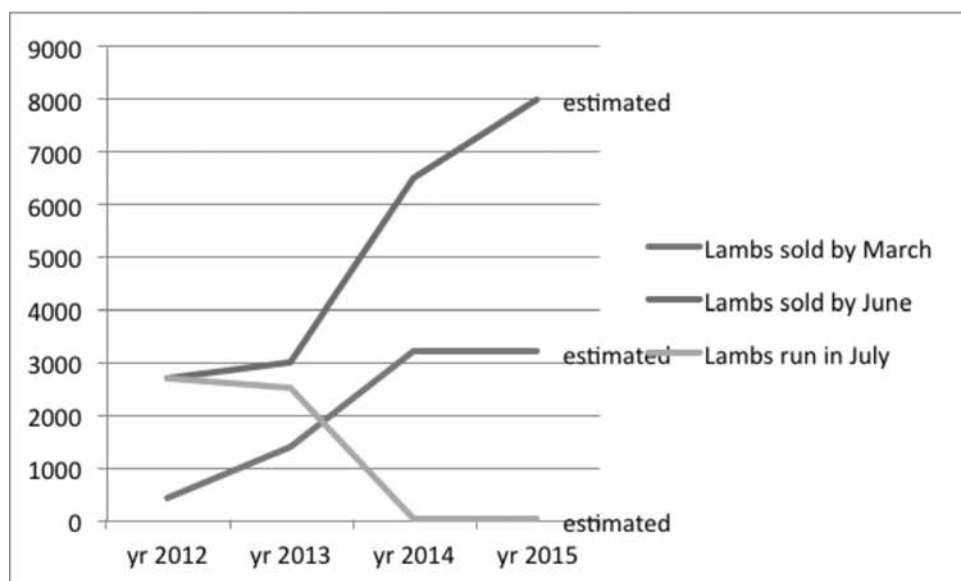
Lambing Percentage on Cropping Ground (exposed country)

Merino ewes producing terminal lambs on exposed country in 2012 gave a lambing percent of 68%, this was our impetus for change. Last year was disappointing with the crossbreds due to a poor scanning from a poor autumn. This year there are no excuses.



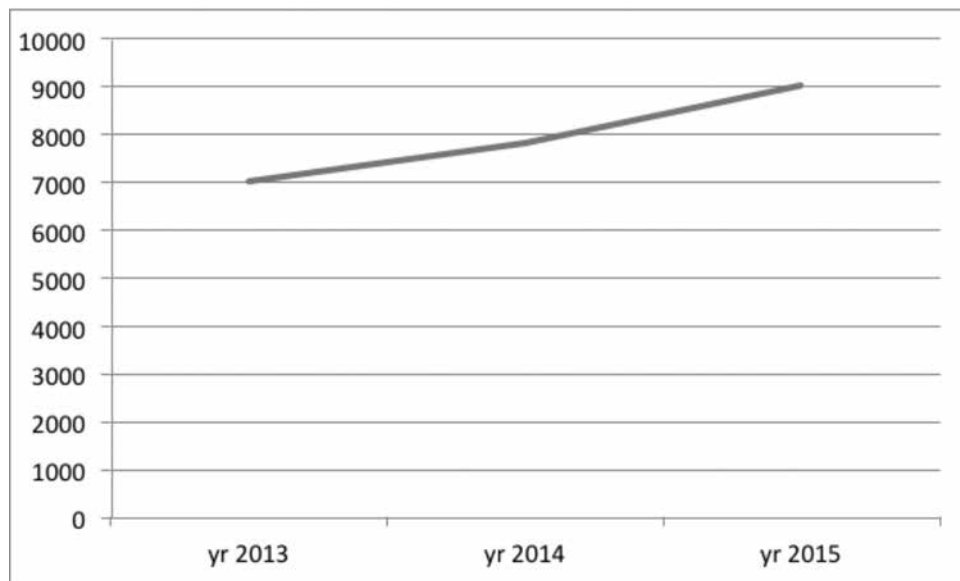
Lamb Turnoff by March and June, and Winter finishing

The second cross lambs finish easier and are off the farm before first cross lambs.



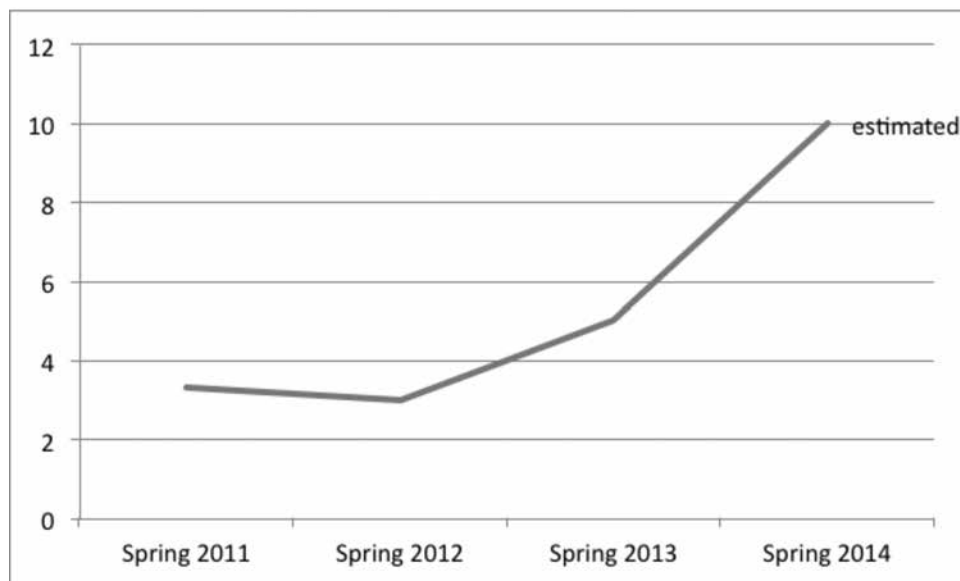
Labour efficiency (2015 is estimated)

Simpler systems, less enterprises and more sheep has lead to an increase in labour efficiency of 7000 DSE/FTE to 7800 DSE/FTE. We estimate it to go to 9000 DSE next year with some improvement in sheep handling equipment. Our long term goal with more lanes and more equipment is 10,000 DSE.



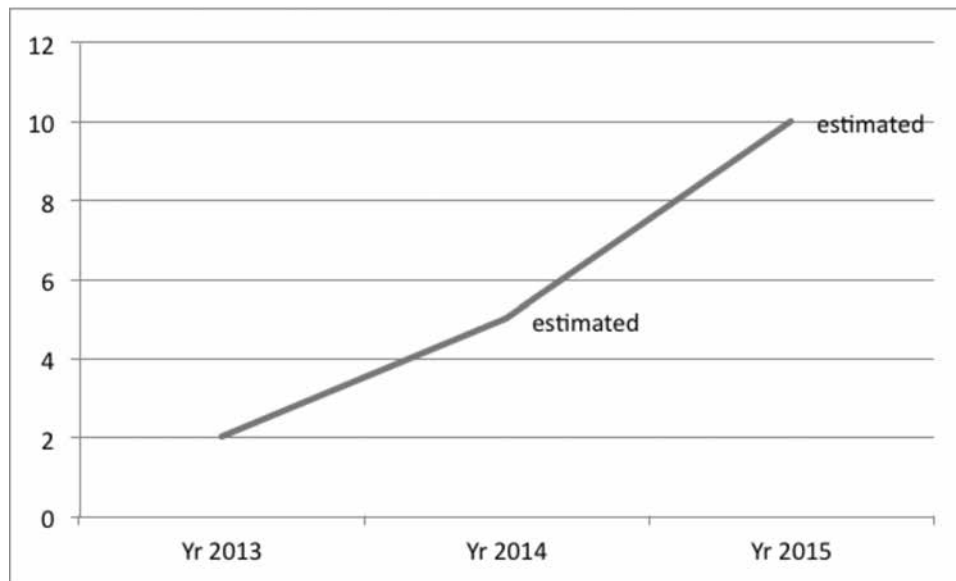
Poppy Gross Income Per Hectare

2014 is estimated. Last year (spring 2013) we saw an improvement in our poppy results after a grass phase. Hopefully next year it will be even better.



Return on Assets, (2014 and 2015 are budgeted)

We are doing all this so our business becomes more profitable, this year we are already seeing some improvement and next year look out!



Future changes for Ramsay Agriculture

We are currently looking at liquidating some assets so as we can be in a position to take up water in a new irrigation scheme for our valley and if this happens then we are seriously considering a dairy conversion. The figures stack up but do the people want to do this?

Other benefits and changes to Ramsay Agriculture through the MLA Challenge

1. Simple Systems

John Keillor was a big believer in simple systems. He thought we were running too many enterprises with merino ewes, first cross merino ewes, crossbred ewes and cattle. In order to maximise profit we needed simple systems to lower costs, particularly labour costs. He also didn't believe in chasing every last dollar, keep it big and simple.

Our benchmarking through Agripath also showed that we needed to lower our costs. When we looked closer at the benchmarking it suggested our income from our assets was excellent, however we were spending too much of the income. Our costs were too high, and simple systems would help to lower costs.

Simple systems are limiting the number of enterprises on a farm, to enable scale within an enterprise. Even within that enterprise the systems need to be simple e.g. one lambing date. The cropping system is now simpler with no cereals just poppies and ryegrass (with a bit of lucerne and clover seed on a trial basis).

2. Genetics

We have researched our genetics needs through our mentor John Keillor and Annie Ramsay (my sister, who works with sheep genetics). Previously we asked our stock agent to buy our terminal rams, now we have researched the best genetics in Australia and Tasmania, and index and ASBV's that are pertinent to our enterprises and brought the genetics in.

3. Lamb finishing

We have been monitoring what we are doing in regards to lamb weights. This year we weighed lambs all through the year. At marking they were 18kg average, at weaning 28kg (220g/day), and then from there the live weights changed depending on feed types. On fodder brassica the range was from 150g/day to 250g/day, on senesced ryegrass they did 185 g/day and on new ryegrass they are doing 280g/day. It is important to know this in order to do feed budgeting as well as marketing, and to give a baseline so as improvement can be investigated.

Currently we are looking through options for animal nutritionist advisors, and their benefits. We are wondering whether to push into higher growth rates through higher feeding of grain or whether to keep the system simple and sell more lambs as stores.



4. Business management

Through the challenge we have also changed our approach to business management. Sam Newsome's (Agripath) visit left us with a couple of key messages. In a business of our size (employing 9 people) one of my key roles as manager was to focus on staff management. Also, Sam with encouraged us to make sure our advisors/consultants and service providers were offering good service. We have reviewed most of these and are currently working through our banking arrangement to make sure we are getting the most value we can as well as our agronomist.

Change: my view

"The only constant in life is change". I think it is important for there to be some take home messages from my presentation. Currently it can be seen that Ramsay Agriculture has gone through a lot of change:

- Assess what you are doing, through benchmarking and goal setting. Is it meeting your goals?
- Change the things that are easiest and give the biggest bang for your buck (lambing date);
- Analyse each change and focus on core issues not twig issues first. Walk over weighing vs stocking rate, analyse based on risk, people and profit (ROI and capital gain);
- Change for the sake of change is not good (but who in reality does this? or think they do this);
- Not changing can be bad too (not changing land use). A balance is important;
- Find a system that works and stick to it. If it isn't working then it needs to be changed (dairy?);
- If you can take the risk out of the change then do it (following someone else's system);
- I don't think it is best to be a trail blazer. Follow someone else's trail who has made it work;
- If you need to be a trail blazer out of necessity, do the research before hand with as much rigour as possible, don't think you know it all (crossbreds at Bothwell);
- Have support systems around you to help with change. The challenge has given us a farm advisor a mentor, tools and a process to support change. All six challengers are making huge successful changes;
- Adaptive management (small changes) is a must and is the key to a successful business and manager. Drought management, bumper years management and opportunity management;
- Have capital available to manage the change so if things go right you can capitalise or ride out the down times till things do go right. Rapid change (growth) needs to be able to be funded through the tough times;
- Have the team around you working for the change. People move at different paces but they all need to be on the path otherwise it will be white anted. Get them to buy in.

Wild Dog Management in SA Pastoral Sheep Zone

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Abstract

Through a landholder initiated project titled "Biteback" the SA pastoral sheep zone is currently going through a change process involving wild dog control and management. In addition to the main funding body, SA Sheep Industry Fund, there are two main stakeholders; landholders and the government agencies. It is important to identify the roles these stakeholders play in the change process as well as the leadership role:

Ownership of the project – the landholders initiated the project which was an important starting point as they are the ones who will do the on-ground works. Another landholder role was assisting with the promotion of a co-ordinated community discussion on historical culture and the process of creating a new culture, so it was driven from the ground up.

Support for the project – the Government agency assisted landholders with technical advice during the decision making process. It is important for this agency to respect wild dog management/control decisions made by the landholders and support them to implement those management measures. More so, was the need for the government organisation to understand that to assist the landholders to change their practices then their own culture would need to change i.e. policies, management styles.

Leadership – the landholder key drivers and Project Officer role was facilitating and coordinating the whole project through developing a culture of trust between landholders and the government agencies. The project needed to bring together the other two key stakeholders and consistently reinforce the individual's values and ethics to create that culture of trust.

Three key learnings have been:

- The people doing the on-ground works are the owners of the project so they must be given the capacity and the trust to take control. It is important not to "tell" landholders how to manage a problem – you must give them the ownership, then support them to achieve their goals.
- Historical cultures take many years to develop; so developing new cultures requires time, resources and commitment by all stakeholders.

Most importantly:

- Regardless of the rangelands management practice, it is the people that need to be worked with; if it is change we are seeking, it is the relationship developed between the government agency and the landholders that will be integral in a successful change project.

Introduction

The area concerned in this change project covers around 250,000km² of Rangelands in South Australia, involves 170 landholders, began in September 2009, and is currently funded until June 2015. This paper will analyse and evaluate the implementation of a project for change within both the landholder group and a government agency. Although this project is focussed on the management of wild dogs in the arid lands region of SA, there was a requirement to look beyond that and develop an understanding of all the stakeholders' needs and the drivers behind those needs.

While it would be easy to think "well, we just need to get rid of the dogs", the underlying issue is far deeper than that. "Getting rid of the dogs" is one of the outcomes, not the solution. Schein (2004 p.15) realized there is more to changing culture than implementing change. He understood before any project can begin, there needs to be an "understand[ing] where culture comes from and how it evolves". This is not only within the community where the culture exists, but within the government organisation that facilitates the process.

For people to even consider a change, Heathfield (n.d.) suggests a "significant event must occur". This significant event is outlined in the following project and this paper goes on to explore the process of implementing a change within the arid lands of SA.



In the beginning

The current culture in wild dog control in South Australia revolves around history; history is exactly that – something that does not change with the times – it remains in the past. The practices that used to work are still happening today (both landholder and government) and are no longer effective because of the changing workplace within this environment. The overall workplace has changed over the last 20 years and will continue to change. This is where the problem lies; the workplace and life has changed but the practices in wild dog control have failed to change with them, both within the community and the government agency responsible for assisting with control.

Wild dog management in the rangelands south of the Dog Fence in SA has been very intermittent and sporadic over the last 15 years. There are a number of reasons for this but first and foremost is the change in land tenure over the years. A number of properties have been bought by conservation groups, Aboriginal groups, mining companies or tourism operators. This has resulted in less need for these non-livestock landholders to eradicate wild dogs. Subsequently there has been an increase in dog numbers. This negatively impacts on landholders operating as stock-producing properties by a decrease in productivity.

Process of change

Heathfield (n.d.) understands the process of changing is very difficult because it asks people to change their behaviours. It is hard for people to unlearn the way they used to do things and to change their behaviours to a new way in a short period of time. To do this requires “persistence, discipline, [community] involvement, kindness and understanding.”

Schein (1997) has three very broad, overarching phases to change that relate very well to this project:

Unfreezing: the group required motivation, need and desire to change. Motivation is caused through the provision of enough data to cause discomfort and unbalance the current practices, such as mapping of where the dogs are and the damage they are doing. From this comes anxiety and/or guilt i.e. landholders with stock loss were very anxious about the problem increasing and non stock-producers could see a need to support their neighbours maybe through guilt as they are currently doing no control. For the unfreezing process to continue the group needed to have a certain amount of psychological safety and enough sense of identity and integrity to begin the change. This was achieved through the landholders coming up with the ideas for change themselves which ultimately gave them ownership of the project. The landholders took the lead in sourcing the funding from industry and only went to the government agency for support once they had that ownership. Encouraging and including the District Natural Resource Management groups in determining the direction of the change initiative helped with ownership.

Cognitive restructuring: this included a number of different paths to follow, with one being trial and error, for example, let's all try bi-annual baiting at the same time and see if it works, and the imitation of role models; let's research what other states are doing and what has worked there, then we could use some of their ideas. It was important to not coerce that change because if coerced, once the pressure was off the behaviour would not continue.

Refreezing: once the new behaviour and core is [was] cemented, a new culture is [was] formed and will stay that way until discomfort begins again. The refreezing phase is yet to fully take place throughout the region, but one area seems to have reached this point. The ensuing years will be a test to see if this is the case.

Considerations during the change process

Six months into the project, it became evident the original objectives and outcomes previously developed required a new focus; from the management of wild dogs, reduction in dog numbers and reduction in stock loss, to the following three clear objectives:

Objective 1: To create landholder ownership of the change process through coordinating community discussion on the historical culture of wild dog management and the process of creating a new culture with the outcome being a written proposal and commitment to the proposal (Local Area Plans).

Objective 2: For the Government agencies to provide positive support in developing change and in the process gain an understanding of the necessity for them to change their own practices.

Objective 3: Provide leadership for a change process with the intent of creating a culture of trust and support between landholders and the government agencies.

Recognising the need for both groups to make changes was the first step. The project officer needed to draw together the two key stakeholders, and consistently reinforce the individuals' values and ethics. Long-term commitment by both groups was required; with the understanding that to create a change in culture is a long, slow process.

The development of a list of all stakeholders and their roles and responsibilities was an important requirement. Included in this was a Communication Plan. This assisted with ensuring all stakeholders were considered and there were clear guidelines for responsibilities and input.

The only way the practical application of the concept worked was for the government organisation to allow the community to come up with the ideas and process of change. The key to ensuring commitment to the culture was to involve all community members in formulating that culture (Broomhead 2007). As Allen n.d. (p344) states 'Ownership is an essential concept'. If people feel their ideas have been considered in preparing the program, they will be more likely to take on responsibility for change and feel in control of their situations. The importance of this cannot be understated, as the only way change can be successful is if those needing to make that change take ownership.

Another consideration in the change process was resources (Broomhead 2007). Changing a culture is a long hard process that will take a lot of time and resources to get the process right. The government agency, industry and landholders needed to commit to this project to ensure it is not the resources that are a component of failure if the change initiative does not come to fruition.

Leadership involvement in change

The process of change needed to be managed sensitively; both the landholders and government organisations needed to assess their current values and beliefs. Community Culture and the Environment (2002) states that culture takes in a wide range of shared and distinct values, beliefs, attitudes, behaviours and assumptions that people have about themselves and others. One of the most important points is for both groups to respect each others values.

Leadership and culture go hand-in-hand during the change process; leadership creates and manages culture (Schein 2004). During the change process it was important for the government organisation to share a leadership role by providing an appropriately skilled facilitator. The landholders had their own individual leaders of the various groups but the government agency needed to provide a facilitator to help the landholders achieve the outcomes.

Pulling together the two forms of change at the same time for the same project required an interesting skill set from the leader;

- the ability to see the big picture,
- the ability to focus on relationships and connections between facts,
- the ability to see new possibilities and different ways of addressing situations,
- the ability to logically solve problems,
- the ability to mentally remove themselves from the situation to examine cause and effect (Kroegeer & Thuesen 1993).

Some of the positive attitudes the project officer needed to possess were open-mindedness, calmness, flexibility and adaptability. The project officer needed to create an atmosphere that valued the history and culture related to the issues on both sides of the coin. By combining these skills and attributes into the one leadership role, both the community group and the government agency had an influential communication tool, one that joined together both groups into a successful change strategy.

Cole (2010 p.714) states that organisations do not change, but it is the people that do. Before these changes come about they must trust the organisations' leaders, understand and support their vision and the reasons behind the change, and also be included in planning the change. Cole reinforces that how the change is led and managed, and how those around are supported through the change process, will have the biggest affect on the success of the change project. Hence the importance of ensuring the leader has the skill set and personality traits to facilitate the change process.

Through encouragement from the project officer, staff of the government agency began to understand the need to support the landholders' ideas and in the process became involved in a change in their own culture, through policy change, management styles and the decision making process. It was at this time, probably more than any other, the project officer needed to gain an understanding of and encompass all stakeholders' values. Each value was treated with respect; this then created respect in return on both sides. Recognising the contribution all stakeholders had to the project was an important step in the change phases.



Future directions

The project has been running for 5 years. Reflection is a continual process and should be undertaken regularly during the project, not just at the end. It will be important for the landholder group to be guided through an analysis of the change they initiated and through this analysis gain an understanding of how future change can be implemented when working with a Government agency. The Government agency will also analyse the change process from an alternative angle by assessing if the method could be used in other projects. Analysis of the process; the skills and attributes required; and reflection on what worked and what did not work, will be combined to provide an influential communication tool, one that will join both groups and provide a successful change strategy. The reflection process could also be used as a platform to increase knowledge on how Rangeland groups and individuals operate and work together during a change process.

Conclusion

This project is currently in the middle phase of change (it is still modifying) and is yet to concretize (Cole 2010). The success of the project lies within the strength of the leadership within the landholder group and the government agency, and the ability of that leadership to maintain the continual assessment of the two groups, to be able to assist and support the direction and continuation of the change. An analogy of this change process is likened to teaching a young child to walk: to begin with, their hand is held all the time, as the child gains confidence, with belief in the child's ability and the child's trust in having someone close by, the adult will let go, just for a short while, catching them before they fall. The process then starts again with the length of time the hand is held reducing until they are able to walk by themselves. This analogy can be used for trust coming from both stakeholders in charge of wild dog control (Government and landholders), which, if combined successfully will implement a successful change plan.

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How feral cats impact on sheep production

Dr Jack Reddin
Murray Bridge, SA

Introduction

Cats can rightly be described as an animal that dances to the beat of its own drum. They come and go as they please. They cuddle up to whoever they want to, when they want to. They eat when they're hungry and they sleep when it suits. In fact they take "studied nonchalance" in to an art form. But they do make excellent pets. And pests!

The cat is an extremely capable hunter especially in Australia where our native fauna has had no experience over the last 100 million years with a predator with such exquisite killing skills. Cats have a huge impact on our fauna.

Cats are also a pest to the Sheep Industry for they are the carriers of two single celled parasites that readily infest sheep, commonly called "Sarco" and "Toxo".

1. **Sarcocystis** – there are in fact quite a number of Sarco's carried by cats and dogs, needing sheep and cattle as part of their life cycle. None are known to infest humans and none appear to cause harm to the various hosts. Sarco lives and multiplies in the cells lining the gut of their carnivorous host, passing out in the faeces in huge numbers where the ruminant host picks up the infestation from contaminated food (pasture, hay or stored grain). In the ruminant the bug hatches out in the gut, migrates to the blood vessels, multiplies in to large numbers and then migrates to the muscles. Cooking kills the cyst but if the meat is eaten raw by a carnivore then the cyst hatches and migrates to the cell wall of the carnivore gut so completing the life cycle.

Each Sarco has a specific carnivore and ruminant host. The one that is relevant to this article is the cat/sheep Sarco. This particular Sarco does not stay as an invisible single celled parasite but is unique in that it continues to grow over many years by which time it is large enough to be clearly seen, looking like grains of rice embedded in meat. This equates to infested cracker ewes being heavily trimmed or condemned on the slaughter floor BEFORE the scales. It is not uncommon for heavily infested lines to lose several kilograms of meat per carcase.

2. **Toxoplasmosis** – another tiny single celled parasite of cats that has the ability to infest a range of animals including rats and mice, humans (implicated in abortion and newborn mental deficits), native fauna, and sheep.

Infested cats pass huge numbers of infectious parasites in their faeces, and if the faecal material contaminates sheep food (pasture, hay and stored grain) the Toxo parasite causes abortion storms if the infested sheep are pregnant. Abortion products on pasture have the ability to infest further ewes and any passing cats that includes aborted foetii and placenta in their diet, thus completing the life cycle

Abortion storms in sheep lead to loss of productivity (fewer lambs, infertility, sterility, and some deaths), occasionally on a massive scale within infected flocks. Losses can also be quite insidious owing to early foetal deaths not being detected until lamb marking, by which time the cause of the poor lambing percentage is rarely investigated or elucidated.

Control of these diseases is very difficult usually resulting in the farming community "tolerating" the losses. Cat eradication would lead to permanent resolution but the cat is a pervasive critter in the Australian landscape. Control measures could include burying sheep carcasses to avoid cats consuming cadaver meat, stop feeding raw meat scraps to domestic cats and of course feral cat removal (shooting, 1080, trapping) may achieve some measure of cat reduction.

Two things to remember

- Feral and domestic cats are genetically identical at the species level. Roaming domestic cats can and do spread Toxo and Sarco, (and contribute to the feral population).
- Cats have a very high reproductive potential so replacements readily move in when a feral is removed – takes around 4 months on average. Removal pressures thus have to be constant to be effective.

For further reading access your State Govt. sheep diseases website.



Commercial application of electronic identification (eID) in your sheep operation

Anthony Shepard
Sheepmatters

Overview

Question: Have you ever wondered which sheep on your farm are really leading the way in driving profit or which sheep are dragging the chain and costing your business money?

When you are looking over a mob of a 1000 ewes coming into the yards, the idea of collecting relevant data on individual sheep is daunting to say the least! Where would you even start?

There are producers who are collecting information about their flock on a sheep by sheep basis, manually. This is time consuming (in both yards and office) and has a high level of human error. These are 2 big reasons that information on a commercial scale is not being collected. In addition, producers are time poor.

Can Electronic Identification (eID) be that tool to make commercial producers smarter with their time?

Understanding your goals

Anthony Shepherd of Sheepmatters lives in the world of reality. He doesn't want to make his clients more time poor, but at the same time he wants to collect important commercial information that will help in identifying the sheep that are driving profit and also those sheep that are costing money.

Sheepmatters has been using eID with their clients for over 7 years. Initially the technology and system presented some practical challenges, however as the tools around eID have improved, the experience and improvements have combined for a more efficient system that is both time and cost effective.

When a producer indicates that they are interested in Electronic Identification (eID), Sheepmatters first response is "what do you want to use it for?" This simple question starts the conversation and helps the producer consider if they really need to use eID at all and if they do, at what level?

The producer first needs to know what their objectives or goals are in their sheep operation. Where are they today and where do they want to be in 3, 5, 10 years' time? There is no benefit in collecting information that has relative low commercial gain to your operation or is not relevant to your objectives. So know your goals!

Learn to swim

We learn how to swim at the shallow end of the pool with a swimming instructor, gain confidence and go to the deeper end of the swimming pool without drowning. As a part of an eID programme, Sheepmatters has swimming programmes to get producers started at the shallow end, and move towards the deeper end as they gain confidence with eID.

"The bigger the expectation, the bigger the potential disappointment"
– Anthony Shepherd, Sheepmatters

Sheepmatters could share stories with you about producers who dived into the deep end of the pool for their first swim using eID. Lots of drowning's and CPR! In some cases producers with that initial bad experience don't want to learn to swim ever again!

Today, because of starting "at the shallow end of the swimming pool" some of Anthony's clients are more than staying afloat. A smaller outlay by starting with a small mob of sheep becomes a learning environment so the producer can understand the technology; how to collect the data, how to save it correctly and what to do with it once they have it!

When first starting to use eID, Sheepmatters recommend the producer invest in the eID tags only, and to put them in a manageable mob of sheep (maidens, feedlot lambs, etc). Sheepmatters then provide all the hardware/software/knowledge that is needed to record and use the data collected by the eID. That way the producer doesn't spend thousands of dollars on products that may not suit their operation. The knowledge and expectations of using eID at the

beginning of a producer's "eID journey" are often quite different to those at the end. It takes 'dipping the toe into the water' for the producer to clarify how using eID will meet their needs.

A classic example is that producers initially think they need to outlay a large amount of money on an auto drafter as part of their eID husbandry equipment, when in fact all they need is a stick reader, which will potentially get them same result minus the bells and whistles.

What Sheepmatters don't want is for a producer to invest in eID, to find out that they:

1. Realise that they only thought they needed it without understanding the capabilities and results.
2. They have spent a lot of money on a system they don't know how to use.

It is recommended that producers speak to an eID expert before purchasing eID hardware. All commercial sheep operations are different, so it is important the producer's expectations are met.

Service is paramount

Sheepmatters could share many stories about the lack of service when it comes to the EID industry. Anthony would put many of his clients in the category of "they know enough to be dangerous", when it comes eID. So when something does go wrong (because it is never the producers fault!), back up support/service is critical.

When purchasing eID products, it is important that support is available. Not all resellers are experts in the technology and are often reliant on the relationship between themselves and the companies who are producing the products. Because there are several components – the tags, the hardware, and the software– it can be difficult to determine where the problem lies and who is responsible for fixing it.

When a producer invests in eID, they want to make sure that as part of that investment there is that critical back up support from the companies.

All the companies that Sheepmatters deals with understand that service is critical for this industry to gather traction, and readily available back up support is a priority. The suppliers are getting much better in this area of service and support, as they realise that support is critical for the success of the eID industry.

Let's work together

It's been a long journey in the eID industry with regard to product compatibility. In the early days, companies were all making their own way to create a usable system. The problem with this was that potentially products from company "A" in many cases, wouldn't work with products from company "B".

In recent times due to the industry needing to gain traction, just about all products from across all companies will work with each other. It is in the eID industry interest that this should happen. In many examples a producer has invested in say, a certain stick reader from company "A". Then he/she is interested in recording a bit more information, so he/she wants to invest in an indicator, and likes the one from company "B". If that were to happen today (it does a lot), the different bits of hardware from different companies are compatible. The result is a happy client.

Resume on the sheep's ear

"It is important that we are using the eID tag on the right sheep" – Anthony Shepherd, Sheepmatters.

In order to maximise the benefits of the eID system, Sheepmatters start with the eID tags and which sheep is wearing them.

The eID tag should only go on sheep where there is maximum gain for productive benefit of that sheep. For example, a ewe that might initially be considered a long-term breeder, but due to a confirmation issue (bad feet, bad shoulders, bad wool type, muffy face, etc) may not actually be 'long term' on the farm after all. As an example, typically on a commercial merino ewe operation, maiden ewes would be subjectively classed before their first joining. So only the classed in sheep would have an eID tag put in them.

What information goes against that ear tag is effectively the sheep's résumé. But importantly, just like your own résumé, you don't want to be putting in useless information that won't help you with a potential employer, so why do the same against that eID tag with your sheep? You want information that will make a difference commercially.

For a wool operation, recording commercial traits such as wool weight, micron and yield is an excellent start to get valuable information to value the commercial fleece. Then in a mob the sheep can be ranked on wool value.



In a prime lamb operation recording traits such as ewe conceived a single, twin or triplet, did that ewe rear the lamb(s) and weaning weight, can tell you a lot about the sire's influence.

In a feedlot operation, with the use of an individual eID tag, weight gain can be recorded. Lambs that are not converting expensive supplementary feed in weight can be identified and taken out of the system.

On the maternal side we can record the ewe's fertility and maternal status. Also commercially, the industry is at a point where we can record lamb to mother using walk over pedigree match making in the paddock. Linking the mother's eID tag to the Lambs eID tag.

Sheepmatters also uses the eID tag to record all health treatments, husbandry and management operations, paddock movements, property movements, faecal egg counts etc.



The eID tag is a tool to collect important commercial information against that sheep.

All vital information is recorded against the individual sheep based on the unique eID number tag, and as new information is added, the resume grows against that constant unique eID number.

Importantly, when it comes time to make decisions, it is up to the producer (often in conjunction with Sheepmatters) as to which information is needed. Even though there may be a substantial résumé against an individual sheep, only specific bits of information are needed make a decision for a particular purpose on a given day. For example, to class sheep on wool traits for joining time (correct wool ewe to correct wool ram), it is possible to view only micron and fleece weight, and hide all the other information.

Sheepmatters works in with the client's sheep classers, wool classers, livestock agents and anyone else that is important in the visual appraisal of the client's flock. For example, fleece and fertility information on client's ewes will be given to the sheep classer. If the classer isn't certain about the sheep he can look up the objective measurements against that ewe to help confirm his/her decision. Feedback from sheep classers is that they see this as a tool that helps them make a decision with more certainty and clarity.

Remember the eID tag on the sheep is the constant tool that all information is collected against, for the life of that animal.

Example: ID v manual tag - time efficiency

This example below is taken from a real operation in May 2013.

On a job that Sheepmatters was involved in, both eID and manual tags were used on 500 ewes in each mob (total 1000 ewes). Information on individual ewe's fertility status at pregnancy scanning (dry, single or twin) was being collected.

The producer wants to compare the time efficiency of using the two different tags.

The pregnancy scanner normally scans 550 ewes an hour, or 11 seconds per ewe, twinning.

The manual tag cost \$0.30 each, eID tag \$1.30 each.

A stopwatch was used to record time for both mobs in yard and office.

The Yard – Recording the Fertility Status Against the Ewe

Identifying pregnancy status in ewes with manual tags took 16.4 seconds per sheep or 137 minutes for the 500 ewes. This was done with one person reading the tag with the ewe in the scanning crate and one person writing down the tag number and the fertility status against the tag number. A number of tags were covered in dirt and grease which made manual reading difficult, and on a number of these tags the person reading the tag wasn't confident it was the correct number. 4 tags were missing.

Identifying pregnancy status in ewes with eID tags took 11 seconds per sheep or 92 minutes for the 500 ewes. This was done with one 1 person scanning the eID tag and recording the pregnancy status. 1 of the 500 eID tags didn't read, so the manual number on the eID tag was recorded into the stick reader with the pregnancy status. 1 tag was missing.

Recording Pregnancy Status - Manual v eID Tags Yard		
	Manual Tags	eID Tags
Sheep Number (hd)	500	500
Time Recording (hrs)	2 hr 28 min	1 hr 53 min
Labour units	2	1
Total Labour Time (hrs)	4 hr 56 min	1 hr 53 min
Labour Cost (\$35.00/hr)	\$172.55	\$65.80

The above table shows just the time and therefore the costs associated in recording a pregnancy status with a manual tag vs. an eID tag.

The Office – Data onto a Spreadsheet

Once all information was collected against both mobs, the next step is put it into a spreadsheet against the tag number of the sheep.

With the manual recoding it took 1 person to type the 500 tag numbers and individual pregnancy status onto a excel spreadsheet 1 hours and 23 minutes. Also it was noted that 23 (4.6%) of the tag numbers, that the person wasn't entirely sure that she was entering the correct number and a further 6 (0.02%) numbers were duplicates.

With the eID recording the data took a total of 13 minutes to transfer/download onto a excel spreadsheet. The information downloaded was the pregnancy status, manual tag number and eID number. This included the one eID tag in which the manual number had to be entered due to the tag not working in the yard.

Recording Pregnancy Status - Manual v eID Tags Office		
	Manual Tags	eID Tags
Sheep Number (hd)	500	500
Time Recording (hrs)	1 hr 23 min	13 min
Labour units	1	1
Total Labour Time (hrs)	1 hr 23 min	13 Min
Labour Cost (\$90.00/hr)	\$124.20	\$19.80

The above table shows just the time and therefore the costs associated in entering data onto a spreadsheet with manual tag entry vs. an eID tag entry.



The Yard & Office – Combined Time

With information collected from the yard and then the data entered into a simple excel spread sheet in the office, we can now look at the efficiencies of the two different means of collecting and entering data.

Recording Pregnancy Status - Manual v eID Tags Total Costs -Yard and Office		
	Manual Tags	eID Tags
Sheep Number (hd)	500	500
Cost in Yard	\$172.55	\$65.80
Cost in Office	\$124.20	\$19.80
Total Cost	\$296.75	\$85.60
Cost per sheep (500 hd)	\$0.59/hd	\$0.17/hd

The above table shows just the total time involved and therefore the total costs associated in collecting data in the yard and then entering the data onto a spread sheet in the office, manual tag vs. an eID tag.

So this example must be taken in context, that in this particular operation, it was about recording time efficiency.

It is hard to put a cost against the wrong information or no information being recorded against a sheep, as this can result in incorrectly ranking that sheep. A sheep, as an example may be a high performance ewe, but due to incorrect information, she may be put into a mob that is joined to an inferior sire with a result of inferior progeny. So the point is, accuracy is very important.

In summary, feedback from the pregnancy scanner

By using eID, the pregnancy scanner didn't need to use spray cans to mark the ewes (dry, single, twin). He said that this is a benefit to him, in both speed and his own health (as using aerosol cans has in the past caused his nose to bleed, resulting in 2 surgical operations). Also, If after scanning, the sheep go back into one mob (singles and twins), by the time they are ready for pre lamb vaccination treatments (5 to 6 weeks pre lambing), a lot of his clients couldn't tell which ewes were single and which were twins due to the spray fading.

Other obstacles avoided with the use of eID that are present when using manual ear tags: The scanner said that his charge is based off a certain number of sheep scanned per hour, so if reading manual tags while in the scanning cage was a common management practice, the scanner would increase the charge per sheep (he didn't say how much). The scanner suggested that as an option to try to avoid additional expense to the producer, after scanning ewes could be put up the race and the manual ear tag numbers could be recorded then, instead in the scanning crate. This suggestion would benefit the scanner, but would mean then double handling of the pregnant ewes.

Lambex workshop

The objective

To commercially index the merino lamb maiden ewes on clean fleece value and fertility status.

The process – Fertility Status (FS)

At pregnancy scanning, the fertility status of the ewe is recorded at the time when the ewe is being scanned. Instead of the scanner having to spray each sheep with a different colour mark, all he has to do is call the fertility status of the sheep, and it is recorded on the stick reader by scanning the ewes' eID tag. Some pregnancy scanners also have the option to enable the fertility status to go directly into their system by using a panel reader on their crate.



By simply scanning the eID tag, the pregnancy status of the ewe is recorded, and importantly is not affecting the flow of the job! Note: an eID stick reader is not an electric prodder!

Data Sheet from Pregnancy Scanning

With the information collected from pregnancy scanning via the stick reader or through a panel reader, the results are down loaded onto a spreadsheet or into specific software.

eID	Manual	Fert
951 000001746750	111290	2
951 000011743693	110868	2
951 000008742813	110604	1
951 000013742192	111305	1
951 000009740225	111277	2

A simple spreadsheet shows the pregnancy status of the individual sheep recorded against the eID tag, which is also linked to the manual tag number.

The process - Clean Fleece Value (CFV)

Collect a wool sample

At sheep classing (while sheep are in yards) eID tags are put into the classed in maiden merinos and a wool sample is collected at the same time. The sample of wool is sent to a wool testing house with a bar code print out of the eID tag number. The wool test file shall be sent back on an electronic spreadsheet.



Taking a rump wool sample of classed in merino maiden ewes. Note the use of a cordless hand piece and sheep handler.

Micron Test Results from Wool Testing House

eID	Micron	FD	Yield	CV	Above30	Comfort	Spin F	Curv
951 000001746750	18.04	-1.65	70.14	19.64	0.8	99.2	16.2	110.25
951 000011743693	18.07	-0.6	71.18	17.32	0.7	99.3	16.85	97.15
951 000008742813	19.89	-0.8	68.55	16.48	0.4	99.6	16.54	87.36
951 000013742192	19.11	1.73	70.15	17.82	1.3	98.7	19.17	104.48
951 000009740225	20.26	2.81	69.69	15.49	1.1	98.9	19.81	81.46

A micron spread sheet from the wool testing house from the rump samples. Note the tag number is the 16 digit eID tag number.

Weighing the Fleeces

The greasy fleece weight is recorded at shearing. The eID tag on the sheep is scanned which enables a printer to print out a barcode, representing the eID number. Once the sheep is shorn, the fleece is weighed on a platform with cell bars connected to an indicator and the barcode printout is scanned. Then the greasy fleece weight is recorded against the scanned barcode number, which represents the sheep's unique eID number.



Collecting fleece weights at shearing. Note:- the bar code printout being scanned, which represents the sheep's eID tag, and that the weight is recorded against the sheep's eID tag number.

The Office

With both the micron (and yield) and fleece weights collected against the individual sheep, the information is “mapped” to the sheep’s unique 16-digit eID number. Using software (in the authors case he uses Koolcollect, by Sapien Technology) a clean wool value is obtained by looking at the value of the micron against a 3-year rolling average clean price from the Australian Wool Exchange (AWEX). An individual yield can be collected with the wool sample or you can assume a yield for all the wool samples. With a Clean Fleece Value (CFV) calculated against the sheep, a Clean Fleece Value Index (CFVI) is also put against the sheep. The CFVI represents where the sheep ranks in the mob. A CFVI of 100 is the average value for the mob.

Once the wool data is collected, its spreadsheet is “mapped” to the separate fertility status spread sheet. The constant on both spreadsheets is that unique eID number. So we can “map” the two different types of information to that one constant eID number, creating a growing résumé against that individual sheep.

Which sheep are meeting your short, medium and long-term objectives?

Important commercial traits recorded against individual sheep all “mapped” to the sheep’s unique eID tag number

eID	Tag	Fert 2012	Clean FLC Value	Index	Greasy Flc Wght	Flc Yield	Micron
951 000001746750	111290	2	7432	113	7.6	70.14	18.04
951 000011743693	110868	2	8117	123	8.3	71.18	18.07
951 000008742813	110604	1	6014	91	7.3	68.55	19.89
951 000013742192	111305	1	6505	98	7.5	70.15	19.11
951 000009740225	111277	2	5290	80	6.6	69.69	20.26

A spreadsheet showing the fertility and clean fleece value of individual sheep.

Decision time

Example 1

The Clean Fleece Value and Fertility spreadsheet can be imported back into any stick reader and taken back out into the yard to be used to make decisions. As an example, you are in the middle of a long dry period and while the market is still good and the ewes are in good condition, you decide you want to off load some.

You bring in the mob of ewes, which have all been indexed on Clean Fleece Value and have a Fertility Status. You wish send in 100 ewes to the sale yards or 20% of the mob.

With just your stick reader you can put in a draft to ID the bottom 20% on Clean Fleece Value. It takes you an hour to scan and ID the lowest valued wool sheep, and then draft them into their own mob.

You have just identified the lowest wool productive sheep and sold them for good money. You have kept the top 80% performing sheep on wool value, and another plus is that you are looking after your farms ground cover. When you come out of this long dry period you will be starting with the most productive sheep on the farm.

You made an objective decision based on production, not age. All based around the eID tag.

Example 2

You are coming up to shearing and there has been a significant rise in the premiums received for 18 micron wool and finer. Using just a stick reader you can set up a draft to identify those sheep in the mob that are 18 micron and finer. They are identified and then manually drafted into their own mob, which has taken you an hour to do. Those sheep can then come in the shed and be shorn as their own mob and the wool baled as that finer micron line.

Example 3

Joining is coming up soon and you want to join 80% to Merino genetics and 20% to Poll Dorset genetics. You like the idea of those 20% joined to Poll Dorset, which will give you some cash flow earlier.

With the same stick reader you have set up a “draft” on the reader to identify sheep that are low on Clean Fleece Value and also a Fertility Status of a single or twin. They are ID and drafted out in readiness for joining to the Poll Dorset.





Stick readers such as this Gallagher HR5 is used to both collect information and then use that information to make decisions.

Important commercial traits recorded against individual sheep all “mapped” to the sheep’s unique eID tag number

eID	Tag	Join 2013	Fert 2012	Clean FLC Value	CFVIndex	Greasy Flc Wght	Flc Yield	Micron
951 000001746750	111290	M	2	7432	113	7.6	70.14	18.04
951 000011743693	110868	M	2	8117	123	8.3	71.18	18.07
951 000008742813	110604	PD	1	6014	91	7.3	68.55	19.89
951 000013742192	111305	M	1	6505	98	7.5	70.15	19.11
951 000009740225	111277	PD	2	5290	80	6.6	69.69	20.26

The traits circled in the above spreadsheet against the sheep, show that both these sheep are both fertile and have a low clean fleece value. These two ewes would be ideal to be joined to the Poll Dorset. Just from this spreadsheet, we can see that the average fleece value from the 2 lowest ranked fleece value sheep is \$56.52, while the remaining three average fleece value is \$73.51.

In the above 3 examples we have looked at just some of the real possibilities available to you to help with your decision-making. You have also started the journey of gaining and using the knowledge of some of the most fundamental aspects in your sheep operation.

- You are selecting the correct genetics to the correct genetics (like to like)
- You are making your decisions on productive traits, not age.
- You are reducing your Cost of Production (COP) by having sheep in your operation that are driving profit and your charity sheep out of the system.
- By knowing what Dry Sheep Equivalent (DSE) you run your sheep at per hectare, you know what they are earning you per HA. Therefore you can compare on a performance basis to other enterprises on your farm.

Summary

“If we were to try and collect all the information we are through using eID, by manual means, we wouldn’t. Just time alone in the manual system, would make it unaffordable to do so” – client of Sheepmatters

So the important key points on eID

Know your goals. Where do you want your sheep operation to be at in 3, 5 or 10 years' time?

- ✓ Learn to swim. Start with eID on a small scale and have your expectations met.
- ✓ Don't invest in expensive equipment. Until you know what you really need, employ the services of a service provider and use their knowledge and strengths.
- ✓ Back up Service. When you do get to a stage where you want to invest in eID hardware/software, the number 1 area that is critical is the support/service that comes with the investment.
- ✓ Only collect traits that matter. Don't waste your time by collecting information that is not commercially viable to your sheep operation.
- ✓ Production, not age. By collecting objective information on your sheep, you are in fact putting them potentially all on the same playing field. Just because the ewe is a 6 year old, doesn't mean she still isn't productive.'

For Sheepmatters, the ability to capture important commercial information for their clients and then make informed decisions has helped their clients to able to take away the guesswork.

Producers are making time smart decisions with certainty by combining subjective with objective information on sheep that are measured on production, not age.



Survive and Thrive

Jason Trompf

J.T. Agri-Source

Introduction

The on-farm value of sheep meat and wool produced in Australia exceeds \$5B pa nationally with strong prospects, particularly for lamb, in both domestic and export markets. However, the continuity of lamb supply is under threat from declining flock numbers, and to improve lamb supply requires a breeding ewe-replacement strategy and continued improvements in reproduction rates at the farm level. Projected market demand for lamb can only be met by radical increases in the carcase weight of lambs and a 10% lift in reproduction rate by 2015 (Palmer 2010). However according to Barnett (2007) there had been little evidence of improved reproduction efficiency over most of the past 20 years, with the number of lambs weaned per ewe remaining relatively stable at around 80%.

The urgency for the sheep industry to address this situation is reflected by the very high emphasis placed on reproduction in numerous industry strategies. For instance the National Sheep meat Research Development and Extension (RD&E) strategy and the Sheep Industry Strategic Plan (SISP) both identify increasing the size of the ewe flock and improving reproductive efficiency as major areas that require industry investment. Furthermore the National Wool RDE Strategy also has an element of its strategy focussed on improving reproductive efficiency.

The main limitation to Australian sheep flocks improving reproduction rates is the degree of reproductive wastage from mid-pregnancy to weaning. More specifically the majority of this wastage (typically >80%) is occurring within 3 days of birth (Brien *et al.* 2009), known as neonatal lamb survival. It is estimated that over 10 million lambs perish in this period from birth in Australia each year (Trompf *et al.* 2012), however with implementation of best practice for ewe nutrition and management during pregnancy and lambing this wastage can be at least halved (www.lifetimewool.com.au). However lamb survival is a unique challenge that not only poses a significant constraint to production that impacts directly on the ability to sustain turn-off rates while simultaneously trying to rebuild flock numbers but also is a looming welfare issue for the industry. The difference between lamb survival and many other challenges confronting sheep producers is there are actionable solutions to apply on-farm that are well researched and currently available (www.lifetimewool.com.au), and in addition recent economic analysis has shown that improving lamb survival can contribute to improvements in whole-farm profitability (Young *et al.* 2014).

The failure of ewes to rear lambs contributes to several inefficiencies which compromise the productivity and profitability of meat and wool production. The obvious implications include reductions in the numbers of surplus sheep for sale, reduced options for selection and culling, and the ability to sustain a younger ewe flock. However lower reproduction rates also means less flexibility in terms of being able to adjust flock structures, enterprise mix and/or the ability to rebuild the flock rapidly following poor seasonal conditions. As well as less ability to mitigate risk by joining more ewes terminally to diversify income streams, and increase the rate of turn-off of more lambs before the growing season ends. The failure of ewes to rear lambs also has negative effects on the quantity and quality of wool produced from the breeding ewe. Ewes that are pregnant and then lose their lambs at birth grow up to 20% less wool than if they were left dry and the strength of the wool staple is also compromised. Such outcomes result in a significant reduction of the efficiency of conversion of feed resources into meat or wool.

The failure of ewes to rear lambs also has implications for the Australian sheep industry from an ethical view point. The Victorian DEPI Sentinel Flock Project, running from 2009 to 2012, reported a loss of over 25% of neonatal lambs at birth. However, in addition to this abhorrent wastage the study found that two-thirds of the lambs died due to inadequate nutrition and miss-mothering and a further 17% of the lambs died due to dystocia, caused primarily by excess and imbalanced nutrition in late pregnancy and throughout lambing. The challenge is to effectively and efficiently enable the everyday sheep producer to adopt strategies that mitigate these causes of loss and in the process demonstrate continuous improvement in the well-being of our national flock.

At an industry level the cost of lamb survival is profound, estimated to be in the order of \$700m in potential revenue lost per year (Young *et al.* 2014), which is detailed below. In addition, reproductive efficiency is also significantly influenced by breeding ewe and weaner mortalities. Industry estimates of annual ewe deaths rates are commonly 6% or more, and over 8% in weaners (DEPI Sentinel Flock 2012; Trompf *et al.* 2012). In fact weaner mortalities are estimated to cost the industry in excess of \$75.8M annually (Campbell *et al.*, 2009; Sheep CRC, 2010).

Despite the economic significance of reproduction, the related production and welfare issues, and well researched solutions, adoption of management strategies to address the loss of lambs, ewes and weaners remains limited (Curnow *et al.* 2011). For example only 17% of Australia's breeding ewe flock are pregnancy scanned for multiples annually (Curnow *et al.* 2011), yet this practice is a critical part of best practice reproductive and nutritional management. Interestingly Barnett (2007) reported that the New Zealand sheep flock, which has widespread adoption of pregnancy scanning for multiples (>85%), had improved reproduction rates by 30 percent over the same period Australia's had remained unchanged. Contributing issues highlighted by Barnett (2007) were the ineffectiveness of communication channels and traditional extension approaches, and mixed messages to producers about the value of reproductive management. Furthermore traditional extension approaches for reproduction were only reaching a relatively small audience. Hence it is imperative to understand why Australian sheep producers have been reluctant to adopt management practices that are fundamental for optimal reproduction efficiency (Barnett 2007).

Improving reproductive efficiency is a significant issue facing the entire sheep industry and it is imperative that it is addressed from the economic, sustainability and ethical perspectives. To enable widespread attitudinal and behavioural change the industry will need to unite, perhaps in a manner never previously achieved, from production on-farm involving both the commercial and seed-stock sectors, to those advising and representing the industry, processors and their distribution pathways for meat and wool products. This presentation will focus on the elements of 'lambs alive- do the five' that will deliver the outcomes required by; (i) building a measure to manage philosophy in the custodians of our flock, (ii) bred well- breeding a sheep that has the environmental fitness to be productive in our highly variable Australian environment, (iii) fed well- feeding the breeding ewe appropriately for their reproductive status, (iv) manage well- managing the ewe during lambing to enhance bonding, protection and survival and (v) adapt well- having strategies in place that enable sheep systems to adapt to climatic variability. In addition, the industry mission is to provide supportive pathways for change, listen to and engage with the broader public on the ethics of production, and drive product demand so that both our meat and wool industries can 'survive and thrive'.

Economics of improving lamb survival

At an industry level the cost of lamb survival is profound. Recent economic analysis showed that the value of an extra lamb surviving birth in a pure Merino system to be worth \$62 and \$85 in a meat system (Young *et al.* 2014). Given that over 10m lambs perish at lambing this equates to over \$700m in potential revenue lost per year.

Increasing conception is less valuable than increasing survival because improving conception leads to a higher proportion of twins and twin lambs have a lower survival rate. At current twin survival rates a 10% increase in scanning may only lead to as little as 2.5% increase in weaning rate. As a result the value of an extra lamb through improved conception in a Merino system, at twin survival rates of 50% is just \$22 (Young *et al.* 2014). It is not until twin survival rates increase to 60% and beyond that increasing conception becomes viable and leads to notable increases in whole-farm profit (Figure 1).

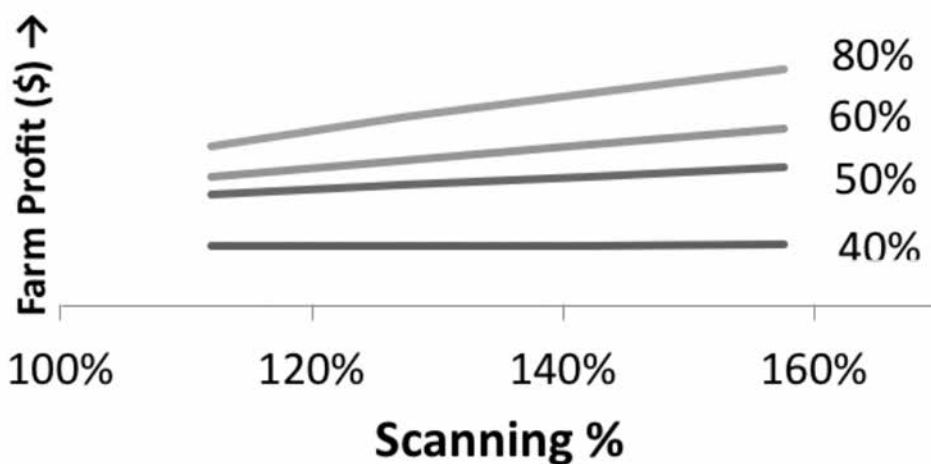


Figure 1. Change in farm profit with scanning % at varying twin lamb survival rates

The value of increasing reproductive rate depends on the sheep system operating. The earlier the turn-off of wethers in a self-replacing Merino system the greater the increase in whole farm profit from improving reproductive rate (Figure 2).

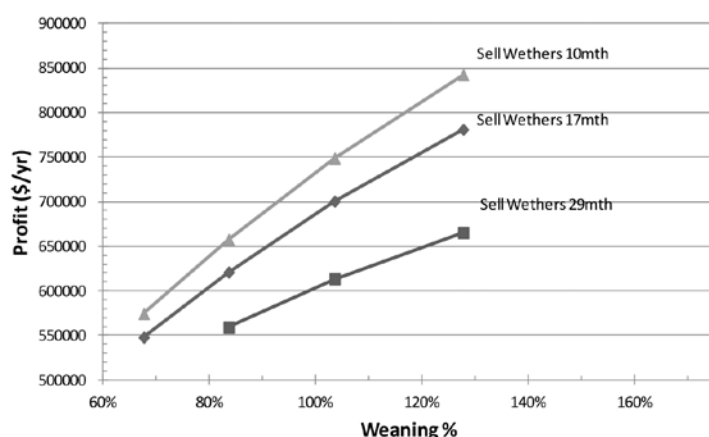


Figure 2. Change in farm profit with weaning % for different Merino systems

The value of increasing reproductive rate is even higher for the meat systems (\$74/extra lamb) than the pure Merino selling wethers at 17 months (\$52/extra lamb). This is predominantly due to the higher sale value of the lambs and for maternal flocks the higher sale value of surplus young ewes (Young *et al.* 2014).

The findings of the economic analysis conducted by Young *et al.* (2014) is supported by a recent benchmarking analysis by Icon Ag and Agrarian Management (2014) highlighted the distinguishing features among the top 25% of businesses based on sheep gross margin among 80 mixed enterprises (Herbert and Ritchie 2014). The data is summarised in Table 1 below.

Table 1. Benchmark data for the five years 2008 – 2012 for the Darkan area in Western Australia high rainfall region (Source: ICON Ag, Darkan WA).

Benchmark	Group Av	Top 25%
Flock structure		
Total DSE	12,341	13,064
Ewes	62%	64%
Wethers	2%	2%
Hoggets	29%	28%
Productivity settings		
Lambing Percentage	84%	91%
Lambs / Ewe Ha	5.8	6.7
Kg Wool / DSE	3.5	3.6
Losses (%)	8.0%	7.8%
Price received		
Net Wool Price	\$ 6.29	\$ 6.31
Sale Price Average (\$/hd)	\$ 61	\$ 67
Income (\$/DSE)		
Wool Proceeds	\$ 21.47	\$ 22.64
Profit from Livestock Trading	\$ 20.02	\$ 25.73
Total Sheep Income	\$ 41.49	\$ 48.36
Expenses (\$/DSE)		
Sheep Costs	\$ 8.28	\$ 7.88
Fertiliser	\$ 2.95	\$ 3.21
Feed	\$ 5.59	\$ 4.93
Pasture	\$ 0.01	\$ 0.00
Total Variable Costs	\$ 16.85	\$ 16.02
Gross Margin / DSE	\$ 24.65	\$ 32.34
Stocking Rate DSE / Winter Grazed Ha	10.4	11.1
Gross Margin / Winter Grazed Ha	\$ 256	\$ 359

The key points of difference in the higher performing farms include:

- Higher stocking rate (+7%),
- Higher lambing percentage (+8%),
- More lambs per hectare (+15%), and
- Higher price for sale sheep (+10%).

These differences resulted in a higher gross margin per DSE (+31%) and per hectare (+40%).

The main advantage the top performers have is a significantly higher livestock trading profit. This accounts for 78% of the difference in gross margin per DSE between the two groups. By comparison there is significantly less variation between producers in wool income. This higher level of variation indicates that the livestock trading profit is more sensitive to management and requires a greater level of attention to do well, particularly in varying seasonal conditions. Clearly, these producers are consistently making better decisions and less mistakes within the reproduction and selling activities of their enterprise (Herbert and Ritchie 2014).

The higher sale value is most likely linked to timing and stock condition rather than the class of stock being sold (eg prime lambs). The top performing producers have the additional stock to sell due to higher stocking and reproduction rates, understand the value of livestock at various times of the year and sell stock accordingly, deriving higher income from their livestock trading.

In summary, the top performers run a higher stocking rate, have a higher reproduction rate so they produce and sell more sheep per hectare for a higher price, with a slightly lower cost base. Given their higher level of profit over time, the inference is they must manage to operate more successfully within the seasonal variability that is occurring (Herbert and Ritchie 2014).

Measure to manage - quantifying lamb survival rates and the causes of lamb loss

Given the impact of lambs produced per hectare on profitability and the sensitivity of key components of this to management (namely lambing percentage) a core challenge for the industry is how to effectively instil a measure to manage culture among sheep producers. This culture is critical to best practice reproductive and welfare management that delivers more productive, profitable and ethical outcomes. Central to this culture is the use of enabling technologies such as pregnancy scanning and feed budgeting. Given that currently less than 10% of sheep producers know the true extent of their lamb loss and even fewer can conduct an energy budget of their ewes (Trompf *et al.* 2011), a massive change in producer and influencer culture is required.

Due to the fact that the majority of sheep producers don't pregnancy scan for multiples (twins, singles and dries) it is difficult to get an accurate estimate of lamb survival on an industry wide basis. However, referring to common pregnancy scanning results versus common marking rates, highlights that lamb survival in both merino and crossbred flocks requires attention, with;

- merino flocks regularly pregnancy scan at 120-140% lambs to ewes joined, yet most flocks mark only 70-85% lambs to ewes joined,
- first cross ewes regularly pregnancy scan 130-160% to ewes joined, yet most flocks mark only 100-125% lambs to ewes joined,
- consistently more than one in four lambs (ranging from 10-45%) do not survive from mid pregnancy to lamb marking.

The loss of lambs around the time of lambing is expensive, due to;

- ewes having been managed for reproduction, yet don't produce any return via lambs,
- a 20% reduction in ewe productivity (primarily reduced fleece weight) associated with lambing and lactation, about half of which is due to pregnancy and the other half is due to lactation, and
- the opportunity cost associated with wasting feed resources on these ewes that otherwise could have utilized by more productive ewes.

Target lamb survival rates that have been found to be achievable under best practice, are;

- 92% for merino single lambs (92 lambs marked/100 Merino ewes scanned 'single'),
- 75% for merino twin lambs (150 lambs marked/100 Merino ewes scanned 'twin'), and
- 95% for crossbred single lambs and 85% for crossbred twin lambs.

Therefore, from 100 Merino ewes, where 10 scan dry, 60 scan pregnant with a single and 30 scan pregnant with twins, with target lamb survival rates applied, approximately 100 lambs should be marked (see Table 2 below). Overall these ewes 'Scanned In Lamb' (SIL) 120% and marked 100% lambs, which represents an overall survival of 83%. However, the common outcome from the same 100 Merino ewes is more likely to be 78 lambs marked resulting from a 80% survival for single lambs and a 50% survival from twin lambs, representing an overall survival of 65% (see Table 2 below).



Table 2. Impact of lamb survival rates on lambs marked for ewes SIL 120%

Survival rate	Ewes joined	Scanned dry	Scanned single	Marked single	Scanned twin	Marked twin	Total marked lambs	Overall lamb survival
<u>Target rate</u> 92% single 75% twin	100	10	60 ewes	55 lambs	30 ewes (60 lambs)	45 lambs	100	83%
<u>Common rate</u> 80% single 50% twin	100	10	60 ewes	48 lambs	30 ewes (60 lambs)	30 lambs	78	65%

In Table 2, applying the target survival rates (instead of common survival rates) to ewes that SIL 120%, halved lamb loss and lifted the lamb marking% by 22% (from 78 to 100%). As reproductive potential (conception rate) increases, the importance of lamb survival also increases because of the greater proportion of multiple births. For example applying the target survival rates (instead of common survival rates) to ewes that had SIL 140% lifts the lamb marking by 35% (from 85 to 115%). Producers can use the 'Lamb Survival Indicator' outlined below to calculate their lamb survival rates. This audit quantifies lamb survival accurately, which is difficult by doing paddock lambing rounds.

Lamb Survival Indicator

Number of ewes joined **A**

Number of lambs scanned **B**

Scanning percentage ($B \div A \times 100$) = **C**

Number of lambs marked..... **C**

Marking percentage ($C \div A \times 100$) =

Survival % scanning to marking ($C \div B \times 100$) =

The first 48 hours of a lamb's life are critical. Around 80% of lamb mortality that occurs between birth and weaning occurs within this period. The factors that contribute to lamb deaths and the ultimate reasons for death are summarized in Table 3, along with the suggested strategies to address these factors.

Table 3. Lamb deaths- contributing factors, ultimate reasons for death and potential strategies to improve survival

Factors contributing to lamb death	Ultimate reasons for lamb death	Strategies to address the contributing factor
Low birth weight	Inadequate nutrition Exposure Predation	Nutrition in pregnancy (particularly twins) Sheltered lambing paddocks Fox control programs
Dystocia due to large lambs	Birth trauma	Nutrition in pregnancy (particularly singles) Shepherding during lambing Genetic selection
Ewes lacking energy to complete birth process	Birth trauma Inadequate nutrition	Nutrition in pregnancy Feed-on-offer in lambing paddocks
Abandonment/ mismothering	Inadequate nutrition Exposure Predation	Ewe condition at the point of lambing Feed-on-offer in lambing paddocks Breeding ewes with better maternal behaviour Mob size and stocking rate at lambing
Poor ewe milk supply	Inadequate nutrition	Ewe condition at the point of lambing Feed-on-offer in lambing paddocks Grain feeding to increase colostrum supply
Predators	Predation	Fox control programs, wild dog community action programs
Adverse weather conditions	Exposure	Sheltered lambing paddocks, paddock aspect in relation to prevailing winds

Fed Well- nutritional management to improve lamb survival

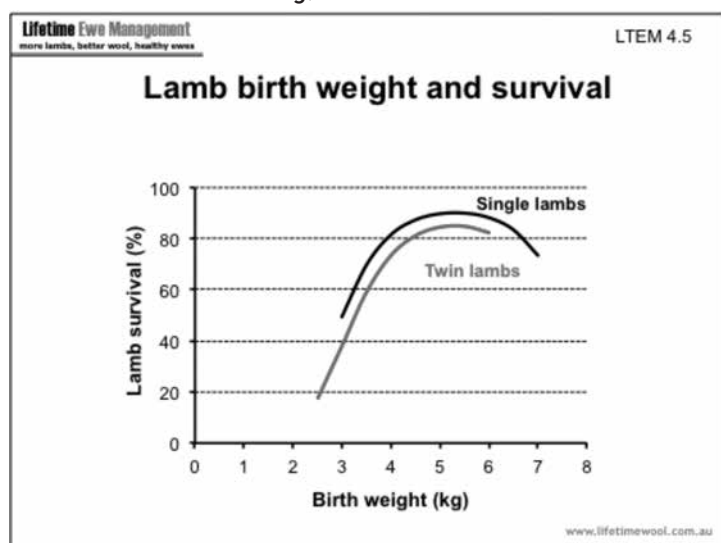
The following information is an extract from the Lifetime Ewe Management Manual (LTEM)- High Rainfall Zone.

Ewe nutrition during pregnancy

Ewe nutrition during pregnancy and at the point of lambing is without doubt the most important issue affecting lamb survival. This is because the rate of survival for single and twin born lambs is mostly explained by difference in birth-weight and ewe condition score (CS) at lambing. Ewe nutrition directly affects birth weight, milk supply, the process of ewe/lamb bonding, lamb growth after birth and ewe mortality.

Lamb birth-weight is determined by ewe nutrition both in early pregnancy (during placental development) and in the last 50 days of pregnancy, which is a period of rapid foetal growth. Ewe nutrition during late-pregnancy has a greater impact on lamb birth-weight (± 0.4 to 0.5 kg) than nutrition during early pregnancy (± 0.3 to 0.4 kg). The optimum birth-weight for maximum lamb survival is between 4.5 and 5.5 kg for single and twin born merino lambs.

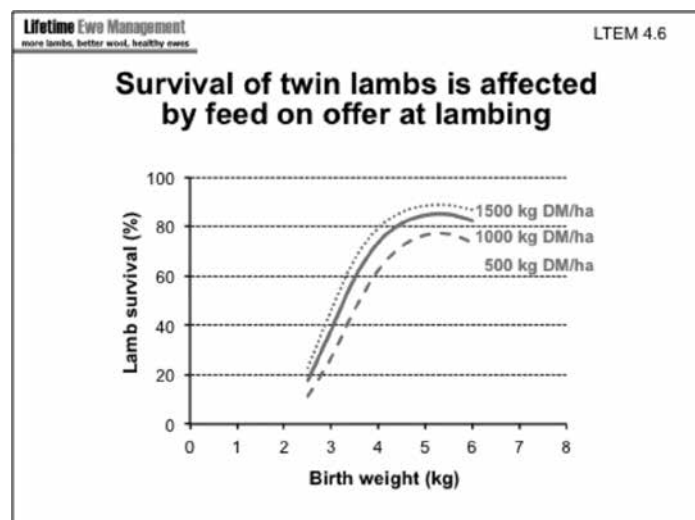
LTEM 4.5 The impact of birth-weight on the survival of Merino lambs (Feed on offer 1000 kg DM/ha and Chill index = 1050 kJ/m²/hr at lambing)



Survival decreases sharply when lamb birth-weight drops below 4.0 kg. Single born Merino lambs typically weigh about 5 kg and twin born lambs typically weigh about 4 kg. A 0.5 kg decrease in birth-weight from the average has little effect on the survival of single lambs, but can decrease the survival of twin born lambs by 15 to 20%. Lamb survival is also influenced by the amount of feed on offer and weather conditions (chill index) at lambing. The negative impacts of reducing feed on offer or increasing chill index at lambing on survival are about twice the size for twin than single born lambs. The effects of low feed on offer and high chill index on lamb survival are also additive.

Higher levels of feed on offer at the time of lambing remove the temptation of the ewe to move away from the birth site. Ideally the ewe and lamb should remain at the birth site for at least 6 hours because it can take this long before a ewe commits her lamb(s) to memory. Increasing feed on offer at lambing from 500 to 1500 kg DM/ha increases the survival and twin born lambs by 15 to 20% regardless of birth weight. Further gains in survival are small (<5%) when there is > 1500 kg DM/ha.

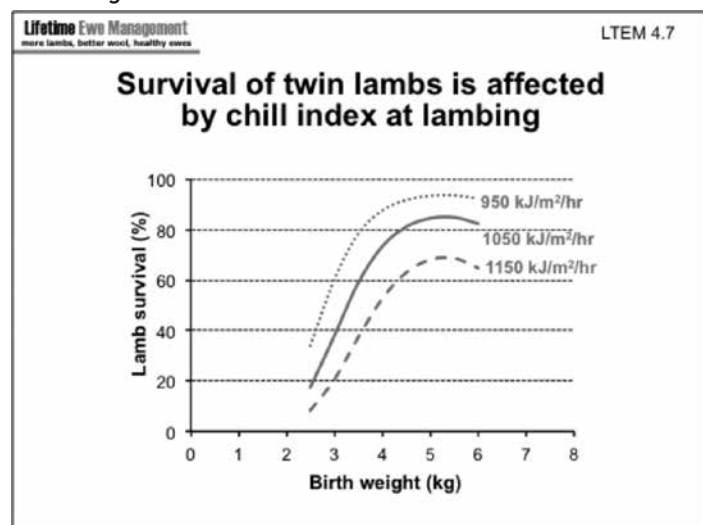
LTEM 4.6 The impact of birth weight and feed on offer at lambing on the survival of twin born Merino lambs [Chill index = 1050 kJ/m²/hr]



New-born lambs are susceptible to cold stress, which increases their risk of death. Lambs born during poor weather conditions maintain their body temperature by metabolizing brown fat (energy reserves), shivering and drinking milk. However, these energy reserves can be quickly depleted and the risk of heat loss and cold stress depends on temperature, wind and rain. These factors can be combined to estimate 'Chill Index', and once this index exceeds 1000 kJ/m²/h the risk of lamb mortality increases rapidly.

Reducing the average chill index at lambing from 1050 to 950 kJ/m²/hr increases the survival and twin born lambs by about 15 to 20% regardless of birth weight. Shelter to reduce wind speed can reduce chill index by 50 to 100 kJ/m²/hr and therefore substantially increase the survival of twin-born lambs. It is often not possible to lamb all ewes down in sheltered paddocks so it is a matter of allocated the most vulnerable flocks to the most protected paddocks.

LTEM 4.7 The impact of birth weight and chill index at lambing on the survival of twin born Merino lambs [Feed on offer = 1000 kg DM/ha]

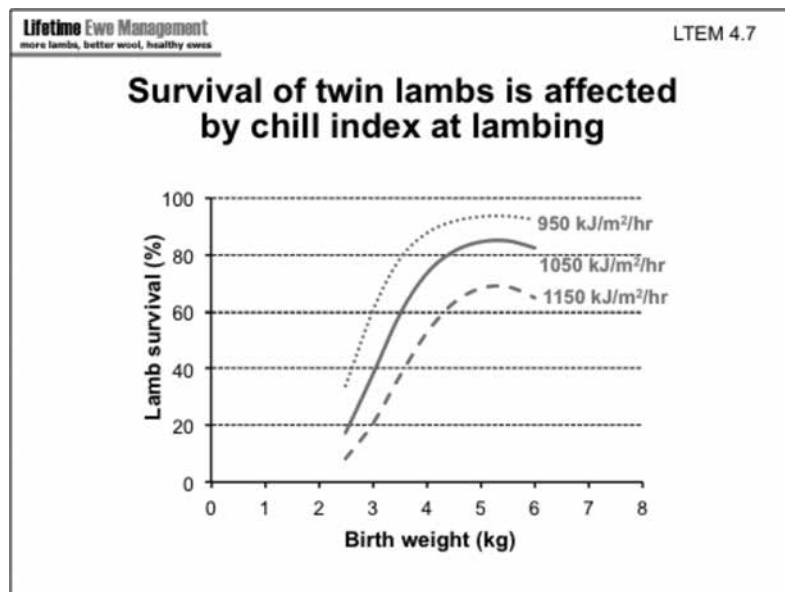


According to Geenty (1997) low birth weight lambs are more prone to die due to inadequate nutrition and exposure because they;

- are generally weaker and less vigorous at birth than larger lambs,
- have a larger surface area per unit of body weight, making them more susceptible to cold,
- have lower reserves of body fat, which reduces their energy levels and resistance to cold climatic conditions, and often have reduced suckling reflex.

To optimize lamb survival a range of factors need to be considered. The rate of survival of twin born lambs especially is related to their birth-weight, but survival of both singles and twins is also affected by feed on offer and weather conditions at lambing. Poor ewe nutrition during pregnancy and low condition score (CS) at lambing also has a detrimental effect on maternal behaviour and lamb behaviour that contribute to increased mortality. The effects of ewe condition score at lambing on lamb survival are shown in LTEM 4.8.

LTEM 4.8 The impact of ewe condition at lambing on lamb survival [Feed on offer at lambing = 1000 kg DM/ha and Chill Index = 1050 kJ/m²/hr]



Lambled well- reducing the incidence of miss-mothering

A recent study was undertaken by the Victorian DEPI to investigate the relationship between ewe mob size at lambing and marking percentage. From the 750 individual mob-paddock observations, the relationship between ewe mob size and marking percentage across all paddocks and breeds is depicted in Figure 3. For every 100 extra ewes in the lambing paddock, marking rates drop by 9%.

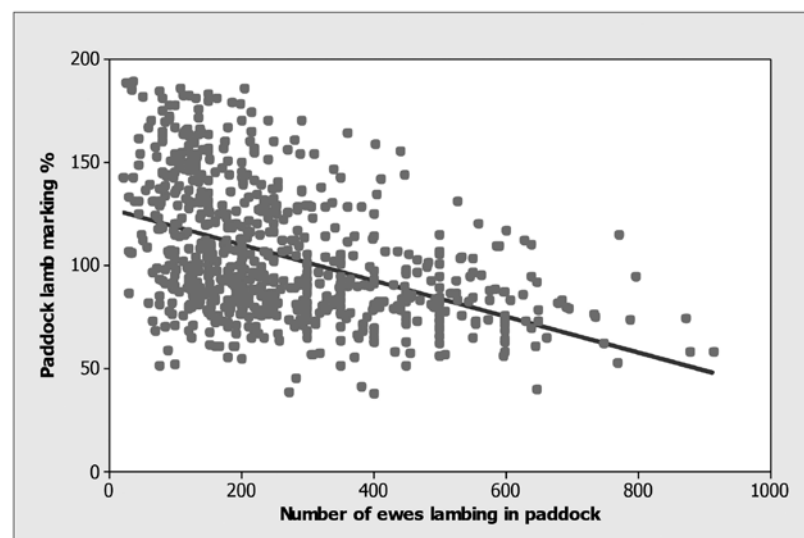


Figure 3. Relationship between ewe mob size at lambing and lambs marked.

Further analysis of this data will be undertaken prior to LambEx and the impacts of mob size and stocking rate at lambing will be updated. However the primary effect appear to be, the more ewes in a mob at lambing, means the more fresh lambs born in a day and therefore the greater the opportunity for confusion and miss-mothering in the lambing paddock.

A common misconception is that if you have larger paddocks you can put in a larger mob of lambing ewes without adversely affecting lamb survival. However most often during lambing ewes don't utilise the entire paddock, preferring to congregate for lambing in certain sections of the paddock. Hence it is the size of the nursery inside the paddock, not the size of the paddock itself, which governs the degree of miss-mothering.

Bred Well and Adapt Well

The latest information will also be presented on strategies to improve the adaptability of sheep systems to varying seasonal conditions, to minimise the impacts of poor seasons on reproduction rates, particularly lamb survival. This will include a discussion about the need to breed sheep that have fitness traits that allow them to perform well, reproduce and survival in a highly variable environment.

Achieving the match between production system and sheep genotype is complex. Breeding for extreme production results in a reduction in the ability of the animals to maintain reproductive function (Rauw *et al.* 1998) unless more resources are made available. However extreme genotypes are by definition exceptionally productive and can be a key component of an efficient lamb production system. The most efficient use of these genetics is through providing nutrition that enables these genetics to perform to their potential. This is only economically achievable by developing pasture production systems that provide this high level of nutrition and the required pasture production systems are only suitable to the higher rainfall zones. In less favourable environments (which includes much of Australia) sheep genotypes that display robustness are likely to best match the production system. These robust genotypes will be better able to maintain reproductive function through periods of sub-maintenance nutritional conditions which are expected in these environments.

The aim should be to breed a balanced high performing sheep that suits the production environment present. Ferguson (2012) highlighted the importance of genetic fat and muscle for improving the robustness of the breeding ewe, buffering conception rates and lamb survival in periods of sub-maintenance nutrition. Many discerning breeders, both seed-stock and commercial, have included these traits as part of their breeding objective and have started to witness the benefits. Particularly, those breeders residing in either marginal environments or with farming systems that result in the breeding ewe having regular sub-maintenance nutrition levels during the reproduction cycle.

The need to have adaptable sheep and flexible systems is an imperative when you consider the variability of the Australian climate. Recent pasture modelling undertaken as part of the More Lambs More Often workshop designed to bullet proof sheep businesses against varying seasons, highlighted that carrying capacity in a medium rainfall environment (500mm annual rainfall) varied from 3 to 15 DSE/ha from a bad year to a good year. This sort of volatility in pasture production, carrying capacity and ultimately profit means sheep businesses must have a range of strategies in place that allow flexibility, particularly in bad seasons.

Impacts of Lifetime Ewe Management (LTEM) and Bred Well Fed Well (BFWF)

Finally the presentation will outline the latest information on the impacts of LTEM and BFWF, which will highlight that the sheep industry is making significant progress in the adoption of best practice to improve reproduction, particularly lamb survival. To date 102 BFWF workshops totalling 2700 participants have been delivered across Australia and have been found to have significant impacts on genetic and nutrition decisions. BFWF has also been found to be a high effectively conduit for producers to become aware and join LTEM. Currently in excess of 7 million breeding ewes are being managed by participants and graduates of LTEM, which represents approximately 15% of the national ewe flock. Detailed evaluation of the impacts of LTEM has found that LTEM participants increased their whole-farm stocking rates by 14%, increased lamb marking percentages by 11 to 13% depending on enterprise type, and decreased annual ewe mortality rates by 43%. These improvements resulted from a significant change in the perceived importance of managing ewes to condition score targets to improve profitability and increases in their ability to condition score ewes, assess pasture quantity and quality, and feed budget.

The LTEM program design provides a blueprint for future extension programs striving to achieve attitudinal and behavioural change. Achieving industry impact is the ultimate challenge for any research and extension initiative. There are few examples in livestock production where the combination of research and education has resulted in the successful uptake of complex management practices. The coupling of the research from the Lifetimewool project, development of practical guidelines and the educational model used to support LTEM has successfully addressed this challenge for those producers that have been engaged.

Next Steps

The future challenge for the industry is to understand why some segments of sheep producers are yet to adopt industry best practice or be engaged in extension programs. With a view to establishing a wide reaching extension strategy that offers a range of pathways for producers and enhances producer involvement in initiatives such as BFWF and LTEM, so that the majority rather than the minority of the national ewe flock and its managers can be influenced by these programs. Participation in these programs has already proven to increase the reproduction rates of the national flock and thus improve the competitiveness, sustainability and ethics of production of the Australian sheep flock. A further challenge for the industry is to effectively engage with the broader public on the ethics of production, and drive product demand so that both our meat and wool industries can 'survive and thrive' into the future.



Becoming masters of pasture

Brad Wooldridge

Arthur River, WA

In a world of CCTV it will come as no surprise that “**Big Brother**” has been watching and recording the way you have been managing your farm and quantifying the productivity of your pastures. Questions arise such as:

- How much pasture did you grow per Ha each day for the past 5 years?
- How many tonnes of pasture per Ha did you grow each year for the past 5 years?
- What impact does seasonal variability have on your farming system?
- How many sheep did you run per ha for each of these years and how does this relate to the feed grown?
- Does your farming system have the capacity to produce more pasture, run more stock or better match stock numbers according to seasonal variability?

If we look at this source of benchmarking information we are able to analyse your historical data gathered by big brother and use this to make management changes. Then use the same technology to quantify productivity improvements on a weekly basis.

Do you have to invest a lot of money to increase productivity or do you have latent potential that you the manager can capitalise on by changing management practices?

By taking satellite data and modelling pasture responses to climatic conditions we are able to obtain the key to unlock the answers to the above questions.

Drought-proofing the family farm business – not the farm

Nigel Kerin

Kerin Poll Merino Stud
"Karuga Park", Yeoval NSW

The Federal Government has only in recent months been bleating about its direction towards a nation of lifters, not leaners. The days of Exceptional Circumstances (EC) and similar handouts in agriculture are over. We need to stand up and be responsible for the decisions we make – or lack thereof.

Agriculture in Australia today compared to 20 years ago is eons apart. With declining terms of trade together with climate variability, rising debts levels, high labour costs, and globalisation, we have little fat left in the system. We have no option but to smarten up our business acumen and be on the 'front foot' in developing a resilient farming business that thrives in this new climate.

For decades, we've had industry leaders and governments tell us that we need to drought-proof our family farms. If it was possible, it would have already been done. We have no control over climate but we do have control over the decisions we make that impact profitability – in any season. One thing we all know is that droughts – managed as they have been in the past – always lead to the same outcome: a scarred landscape, depleted ecology, and a bank balance starved of funds. And to top it off, we have the next generation asking themselves the question, 'is this what I want for my life?' Most of us are able to make money in the good years but very few have the systems and discipline in place to hold onto it in the bad years.

In response, my wife, Kate, and I began eight years ago learning the value of education, mentoring and business coaching. We wanted to turn this variable climate we have into a positive. This process has been both exhilarating and rewarding, giving our business a degree of control that we have never experienced before. It has totally opened up our eyes to what is possible in agriculture through abundance thinking. Through a process of learning, we implemented systems that we now consider to be the non-negotiable "gold nuggets" of any agricultural business:

1. **Formal Working on the Business (WOTB) meetings**, held monthly with interrogation of the current financials (Business Position Statement, BPS)

We exchange a minimum of two Discussion Topics (DTs) with our Production Manager and his wife, at least two days before our planned WOTB meetings. They supply the same to us. We also monitor how the people in the business are travelling through People Ratings, where each business member rates how they feel on five difference subject areas (eg: stress, feeling in control, communication, workload, family balance). Over a three-hour meeting, we go through the updated business financial position (BPS) to monitor cashflow shortfalls in the months ahead, and plan to fill in any gaps where we can with sales of animals, so that our overheads and direct costs are paid from cashflow – not borrowings.

2. **Working in the Business (WITB) meetings**, held every Monday morning

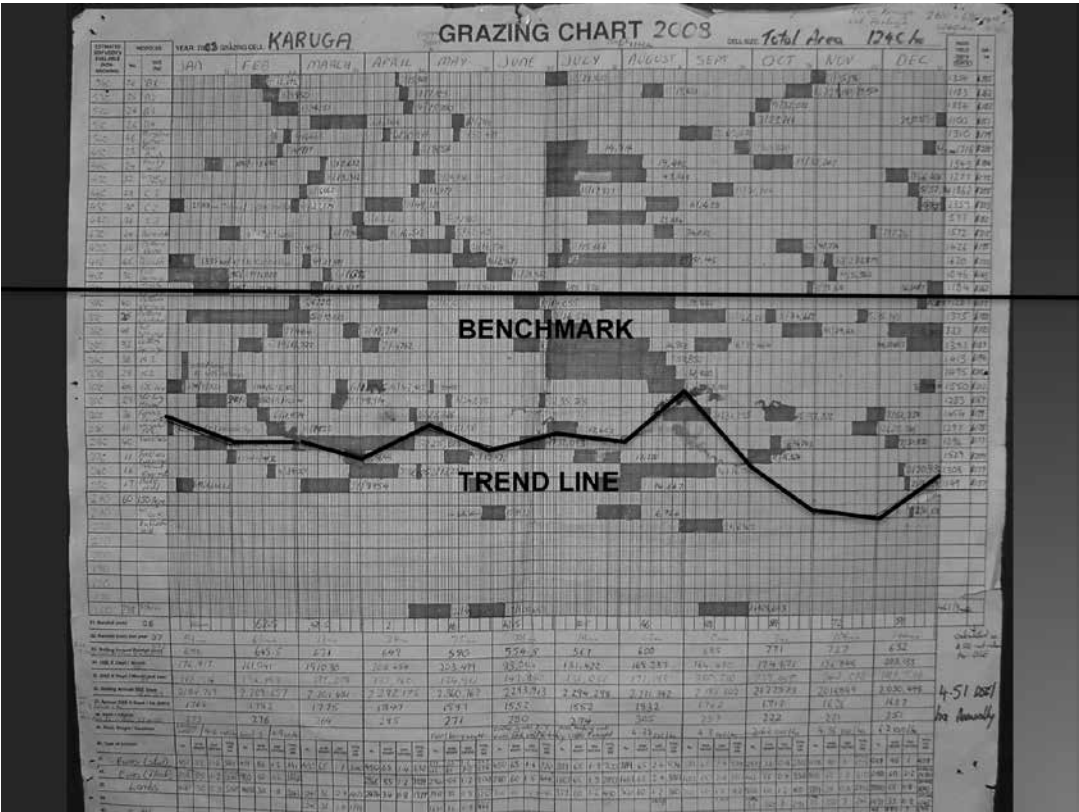
These meetings are held with the operational staff members to plan that week's activities, who's doing what, and on what day. Each activity is catergorised in a Priority Matrix (urgent, non urgent, important, not important). This planning session allows all members of the operations team to have a clear understanding and input into their week.

3. **Grass budgeting and grazing charts** – matching stocking rate to carrying capacity in all seasons. Without doubt, this one is the hardest to learn and implement, but the most important factor that contributes to profit. We're constantly monitoring the trend line on a grazing chart, which factors in the amount of animals on-hand, the amount of land we have to run them on, and the amount of rainfall we've recorded. What makes this a 'green and growing' business is maintaining 120 days of grass on-hand for our core breeding herd and adjusting stocking rate to carrying capacity accordingly. The trend line and grass budgets tell us up to three months in advance if stocking rate is exceeding carrying capacity. This allows us to make destocking (and re-stocking) decisions very early to ensure we're not overstocked and depleting our resource base, or understocked and missing out on opportunities – and cashflow into the business!



See figure 1 below

Figure 1:

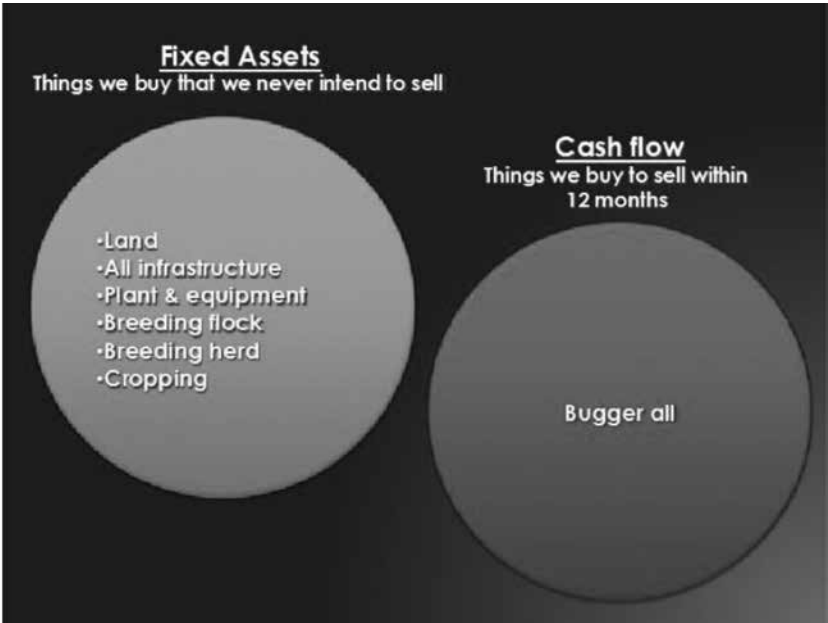


Retail agriculture

In retail, there is a constant focus on the turnover of stock. In successful retail businesses, last year’s stock is gone before the new season’s products arrive – even if that means selling at a discount. Farmers are notoriously bad at selling and our main interest is on the accumulation of assets – asset rich, cash poor.

See figure 2 below

Figure 2:



We as farmers need to sell more often simply because we need the practice. In our business, we needed to move to a state of being asset rich AND cashflow positive. How? The first hurdle was to move from 100% breeding to incorporating livestock trading into the business. We believe that in today's climate, it is virtually impossible to hold 100% of a farm's carrying capacity in non-disposable breeding stock. Why? Emotional attachment won't let you destock when feed budgets and grazing chart trend lines indicate that you should. Once drought hits and an auger is jammed into a silo, it pretty much spells an end to cashflow into the business through livestock sales. Instead of sales, we have mounting feed bills and money only flowing out of our bank accounts. We have at this moment entered into a mode of existence thinking rather than abundance thinking, and are not mentally open to investigating the new opportunities that drought always presents. Then there's the impact on our landscape – the silent depreciation cost that is rarely measured, which is the loss of species biodiversity in our pastures and reduced water use efficiency (WUE).

We maximise turnover (and regular cashflow) by entering livestock trades that last up to four months, eg: finishing lambs to trade weights, buying poor cows to fatten for the grinding beef market, or joining and scanning a ewe to sell pregnant to a restocker. The other reason for entering short livestock trades comes back to grass. We never enter a trade unless we've got the grass in the paddock to finish it, as determined by grass budgeting and the grazing chart. We were forced to this more flexible system to accommodate a 'bipolar climate' – one of extreme highs and extreme lows.

4. **Coaching and mentoring** - Bringing an external coach into the family farm business is all about keeping you on track to reach the goals you've made – both business and personal. The major job of a mentor is to hold your hand as you navigate through the changes that need to be made to be successful in agriculture today. I left school at 14 years old and went jackarooing. I did no further education until I was 38 and now have a PhD – **Pig Headed Discipline**. A business coach and mentor help to ensure this discipline rarely wavers. Without that external support, most people simply cannot maintain the level of discipline required to stay focused.
5. **Response to Drought** - When the trend line on our grazing chart starts heading up for two consecutive months, we treat this as an early precursor for drought and complete a Response to Drought document at WOTB. In this, we note each class of animal on the farm, what will be the impact of drought on that class, and how we will respond to prevent any negative impacts to ecology and cashflow. See figure 3 below.

Response to drought risk – WOTB February 2009: If no rain by the end of February....	
Impact	Response to Impact
Trade lambs 1400 - weight gain falls below 100g/day	If no rain by the end of February, the tops will be sold over the hook, what is left will go back into re-stocker market
Trade cattle – weight gain falls below 500g/day	Sell tails out of Braford's and Angus by early March. Preg-test Braford and Angus heifers mid-April and sell all
Karuga wether lambs weight gain falls below 100g/day	Tops will be sold over the hook, what is left will go into re-stocker market by the end of February
Karuga ewe lambs – will not reach 43kg by April 1	If the above actions are taken our target joining weights will be achieved
Karuga breeding ewes – they will fall below far score 2, poor conception rates, lower fleece weights	De-stock of pastures onto stubble country and give them "McCosker Brew", then agist if season continues to fail
Naringla composite lambs – still have 120 days grass on hand	Will hold to fill contracts in April
Naringla composite ewes – still have 120 days grass on hand	Can hold for four months on McCosker Brew and dry feed, re-assess at March WOTB
Locusts arrive	Crisis meeting, instant assessment of grass budget and destock as required
Stressed people	Weekly WOTB will commence as soon as stocking rates start to exceed carrying capacity, when forecasted two month in advance on the grazing charge with average rainfall.
Increased workload because of drought	Don't confuse activity with achievement. If workload increases because of drought take a good look at your management because you're doing something wrong!

Figure 3



By completing this above table two to three months in advance, we remove the emotion associated with destocking, and have our finger on the pulse with regards to maintaining cashflow (balancing the two inventories of grass and money).

For the next generation asking themselves whether farming is for them, I believe there has never been as much opportunity for livestock businesses as there is right now - created as a result of our increasingly variable climate and the topsy-turvy livestock markets that result. It's not all bad news!

That said, it is highly unlikely we will change the future with the same thinking that created the past.



A SheepConnectSA focus farm

Emie Borthwick

Pillaworta, SA

Farm Snapshot

Property Size - 1400ha

Average Rainfall - 500mm

Area

- 1085 ha hills grazing (272ha arable suitable for improved pastures)
- 167ha Arable cropping (oats, barley, wheat)
- 148ha Native Vegetation

Pastures improved

- Native Grasses, medic, annual grass (wild oats, barley grass, capeweed and silver grasses)
- pastures cocksfoot, Italian rye grass,

Sheep numbers - 1900 Merino ewes with 60% mated to merinos and 40% to White Suffolks.

Aim - 21 Micron wool and to breed bigger, plain bodied sheep.

In 2009, Pillaworta was established as a SheepConnectSA Focus Farm, funded by Caring for Our Country, Australian Wool Innovation, Eyre Peninsula NRMBoard and Grain and Graze 2.

Key areas of focus were, to increase stocking rate on the property through improved grazing management and pasture production while reducing erosion potential using fencing, paddock size, watering points and native vegetation.

Benchmarking the business was the starting point to identify key profit drivers and highlight opportunities for change. Evaluating the business over 4 years has enabled us to set goals, manage input costs and examine technical efficiency.

Yearly benchmarking enables us to monitor our production based on gross margins/ha and GM/DSE for wool and meat income as well as monitoring expenses GM/ha and GM/DSE.

Pillaworta's stocking rate was 3.9 DSE/winter grazed ha (WgHa) in 2009, with a potential of increasing that to 9 DSE/WgHa based on growing season rainfall and improved pasture and grazing management.

Although the current stocking rate of 4.4 DSE/WGHa is still below the property's potential of 9DSE/WGHa, the key performance indicators reflect some benefits of the changes to management made over time.

For Example:

- Pillaworta's Gross Margin/DSE in 2009 was \$15.73 and in 2012 rose to \$49.23 GM/DSE.
- Gross Margin/WGHa in 2009 was \$61.66 rising to \$190.88 GM/WGHa in 2012.
- Operating efficiency of \$0.45 in 2009 falling to \$0.27 in 2012.

*Note changes in market prices for 2009 and 2012 are also reflected in these figures.

To achieve the property's potential, key profit drivers were identified

- Increase stocking rate per ha
- Increasing wool and meat production kg/head/year
- Increasing reproductive percentage
- Reducing death rates

A farm management plan was developed together using technical knowledge, local knowledge, research, benchmarking indicators and the natural environment.

Paddock sub-divisions were mapped to ensure an effective whole farm plan incorporating watering systems, biodiversity corridors, rotational grazing, pastures, native grasses and crops. Nine paddocks averaging in size from 76ha to 175ha are now 22 paddocks averaging 39ha.



An increase of 200 self-replacing ewes per year was the aim to help with the costs of implementing changes. With a steady increase in stocking numbers we have the ability to be flexible and adapt to changes over time. In 2009 we began with 1200 breeding ewes and now we have 1900, which has also given us an increase in wool production from 13.8 Kg/WGHa in 2009 to 16.1 Kg/WGHa in 2012/13.

Maps of the property clearly identified feed utilisation as an issue, with some areas being overgrazed in large paddocks, resulting in low ground cover and erosion risks while other areas were untouched, encouraging annual weeds.

Utilising the grazing potential for the various pastures is critical to improving production and managing soil cover. Establishing perennial cocksfoot on arable land increased grazing potential. Italian ryegrass was established to provide high quality feed for weaned lambs in spring.

Low input cereals were also utilised for early feed at the break of season and then grazed as a standing crop in summer to finish of lambs.

With changes to grazing management, in 2012, 1700 ewes were run as one mob rotating through grazing paddocks prior to lambing. The ewes were set stocked in smaller mobs for lambing with twins and singles separated. Lambs were marked at six weeks and then the 1700 ewes with lambs at foot were run as one mob with a stocking pressure of 130 DSE/ha and rotated every 4 or 5 days. With 22 paddocks, pastures were then rested for a period of 30 days in winter and 60 days in summer allowing for regrow. This has resulted in more even grazing pressure across all the paddocks and better weed competition from the perennial grasses.

Moving a large mob with lambs at foot was easy from one small paddock to another, it became routine and gave us an opportunity to identify and monitor any animal health issues early.

Stocking pressure and rotational grazing encourages native perennial grass composition in the un-arable hills providing better ground cover management. Fertiliser history in the hills has been very poor with very low phosphorous levels. MAP and single super have been aerial spread in the past two years resulting in increased pasture growth. With improved soil fertility along with managed grazing the benefits are more organic matter, better water holding capacity and water use efficiencies.

Another target was to increase lambing percentages from 80% in 2009 with a lambing loss of 6.9%. Through a combination of improvements to animal management including: scanning for singles and twins, managing the ewe's nutritional requirements with mineral and salt licks, increased worm testing and monitoring, lamb marking in paddocks and selling dry ewes were tools that improved the properties potential. As a result lambing percentages increased to 113% in 2012/13 with a reduced lambing loss of 2.5%.

Soil tests and demonstration sites were established to investigate response of pasture and native grasses to different rates of fertilizer and trace elements. Soils were deficient in phosphorous, zinc and copper. Pasture cuts were taken to measure dry matter production responses and during spring analysed for nutrient level and feed value. High phosphorus and sulphur applications recorded the highest dry matter result.

The Focus Farm monitored changes and progress, offering workshops, demonstrations, data collection, field trips and guest speakers for other landholder's to gain knowledge, over four years through the SheepConnectSA program. While supporting and encouraging effective management on-ground, for economic and environmental sustainability of our industry for the next generation.

Redesigning the Merino

Andrew Mitchell

Mintaro, SA

My family and I have a farm at Mintaro in the mid north of South Australia. Mintaro is just east of the Clare Valley, and has an annual rainfall of 600mm. We also have a block of land 15km to the east in 450mm rainfall country which is where most of the breeding takes place. The property is 2600ha which includes 600ha of leased land.

We continuously crop 2000ha of that and graze the sheep on the remaining 600ha over winter. We also have 24ha of vines, producing Riesling Shiraz and Cabernet Sauvignon.

We are currently mating 2400 merino ewes to merino sires. Some of which are ewe lambs.

We have originally come from traditional SA based studs, but in 1996 moved to a high-performance wool-based objectively measured stud. This was our first introduction to ASBV's in the form of EBV's.

This genetic source took us from a 25 micron clip down to 20 micron in less than ten years. In that time we also gained wool cut. However some early maturity was lost and they had more skin.

In 2004 we made the decision to try to get that early maturity back and reduce the skin on the animal. So we revised our ASBV selection and as a consequence moved to a genetic source that would provide a true dual-purpose animal.

I mated these rams separately and tagged them and then followed them through. The increased size was evident they were also plain, however we did not compare the wool cut.

In 2010 we started to chase EMD and Fat in ASBV's. I had heard that it could bullet proof the flock. It could give animals fat and muscle reserves, to draw down on in tough times. Due to the nature of our farm our sheep are often in a feast or famine. With stubbles and the farm being spread out, it is not always easy to match the sheep's requirements with the pastures or stubbles available.

Since then we have tried a few other studs and always tagged the progeny to get a gauge on their performance. Often what you see when buying a ram is not what will be represented in the progeny.

ASBV's take the phenotype out of the numbers shown to you in a ram catalogue. No they are not 100% accurate, but their accuracy is shown to you in a small number under the figure you are scrutinising.

Lamb growth rates have been the most noticeable gain since 2004. It previously took us 14 months to get lambs up to be killed now we are down to as short a time as six months.

2013 July drop lambs at weaning

- Singles averaged 33kg at 13 weeks from the start of lambing, this works out at 378 grams a day.
- Twins averaged 25kgg at 12 weeks from the start of lambing, this works out at 315 grams a day.
- 40 days later those twin ewes averaged 35Kg, putting on 250 grams a day over that period.

Carcass yield has also increased since 2010 with the use of high EMD sires. We were originally quoted 40% when buyers came to buy the lambs, but since going over the hooks the carcass yield has steadily increased to 46% of live weight straight out of the paddock.

Our wool production we knew was always fairly good for its micron. So over the last ten years we have just tried to hold the wool weight stable. With the move to 8-month, and now 6-monthly shearing we are trying to push this to 4kg per shearing. Buying rams of +15 to +27 on ASBV's should get us close to that. We are currently cutting between 3.2- 3.6kg for each 6 month period, or 6.5-7.0kg/ year.

Wool length for the 6 month period is 60mm, we would like to push this out to 70-80mm. Using rams of high staple length +10 to +17 and culling short wool hoggets, should enable me to get there.



Lambing percentage

Overall it sits at 95-100% but we have had many varied results since we have started to scan ewes.

- Twin ewes ranging from 170% down to 110%
- Singles ranging from 101% down to 62%

But, ewe lambs mated at 7- 10 months bring this figure down.

Scanned dry ewes are sold

Flock Management

- No jetting ewes, the right wool and structure, reduce the need for jetting.
- Any ewe that is body struck is culled.
- No pulling lambs. Any lamb pulled is tagged and the ewe as well to be culled.

We have very few hogget or ewe lamb deaths due to lambing difficulty, about 1 %.

In conclusion we are trying to breed a merino that is plain, easy care and in balance with its environment. An animal that will survive and thrive if left unmanaged and yet, when put in to a well managed favourable environment will push the boundaries with growth, wool cut and fertility.

Where growth rate is central to profit

Charlie de Fegely

“Quamby”, Dobie Vic

Introduction

“Quamby”, is in the Dobie district which is 12 km east of Ararat in western Victoria and has an average rainfall of 575mm. Our farming operation comprises of a dual purpose merino flock, a flock of composite ewes, and winter cereal cropping. The pasture base is made up of Holdfast GT Phalaris and Trikkala sub clover and short term Rye grass pastures which is part of the cropping rotation.

Business target

The most profitable lambs for us are those that are sold direct to processors at weaning. The ideal lamb for this environment is a trade lamb with a carcass weight of 20-22 kg. Our target is to have all lambs sold to the processor with a carcass weight from 18-22 before Christmas. The lower than ideal carcass weight covers adverse seasons and or the progeny from the ewe lambs.

If we have to wean lambs and put them into a finishing system our costs per lamb increase by about \$25 and \$35 per lamb. Whilst we aim to sell all lambs direct to slaughter at weaning, there are some especially twins, which sometimes have to be weaned to allow the mothers to regain weight prior to the feed drying off.

The challenge for our system is the reduction in our growing season from 7 to 6 months which appears to be a result of climate change. Therefore we need to have a flock of breeding ewes that can rear lambs to a slaughter weight at 12-16 weeks of age. The key factors for us to achieve this level of production are good management, productive pastures and the right genetics.

Lamb growth rates

In order to have lambs ready for slaughter at 12 -16 weeks, they need to grow at 350-400 grams per day. Last year the first load of lambs went out at 14 weeks from the start of lambing at an average live weight of 47 kg's, which was a carcass weight of 22 kg. These lambs had an average growth rate of 430 grams per day. The lambs in the first load out were predominantly single born lambs.

The last load of lambs sold were predominantly twin born lambs, which grew at an average of 330 grams per day and were sold at 18 weeks of age at similar weights to the single born lambs. Last year the seasonal conditions were favourable which meant the twin lambs weren't weaned. Given less favourable conditions in the future we would wean the lambs to look after the ewes.

Management

The most critical factor to achieve optimum lamb growth rates is the condition of the ewe and we start monitoring them at weaning and will draft them according to their condition so that the lighter ewes can be given extra supplementary feed. Scanning is the most critical operation for us to manage our ewes to allow them and their lambs to meet their potential. Therefore we separate the ewes into singles and twins and again if necessary according to their condition (fats & skinnies). They remain in their scanned groups until scanning the following year. In the past we have not separated the twin and single bearing ewes which resulted in the twin bearing ewes not receiving the care they required. As a result they could have been dry or only have a single in the following year.

Generally we have close to half the flock rearing twins who need to be given extra care pre and post lambing. They are given the best feed and shelter and we lamb them down in small mobs in small paddocks. The ideal is 80-100 ewes in 12-14 hectares. This is not ideal for cropping and as a result, we have developed simple fencing systems that can be easily and quickly erected and removed. We have increased our lamb survival rate by 20-30% by lambing in smaller mobs.



Pastures

The other key factor to top lamb growth rates is the pastures they eat. The first factor in a good productive pasture is the amount of legume content. We strive for 30-50% of sub clover in our pasture swards. When we renovate or resow new pastures after cropping, we will sow sub clovers at the rate of 10 -12 kg per hectare plus the perennial grass.

We have a range of pastures with the phalaris being the pastures for lambing and the rye grass for late lactation and weaning pastures. We have a very small area of Lucerne but as our soils are sodic, they are not ideal for Lucerne. The last two summers have been very dry and the Lucerne has not produced any significant out of season feed. As a result we aim to have lambs sold during the spring period and not rely on summer fodder crops for out of season feed.

Genetics

The third factor in achieving optimum lamb growth rates is the use of top measured genetics. We have seen the value of using top genetics in achieving high lamb growth rates so we work closely with our genetics provider and to select the right rams for our system. Whilst we use figures as a means of selection we also place heavy emphasis on visual traits as well. The traits we look for in our rams are growth (weaning weight), muscle, fat and birth weight.

As we have both merinos and composites in the flock and we select different rams for each flock. The rams that we select for the merinos and ewe lambs are selected with similar traits to the rest of the flock but pay greater attention to birth weights traits.

The other genetics selection tool is the selection of our own replacement breeding ewes. We start our ewe selection process with the ewe lambs which are mated to terminal sires and then if they lamb, they are mated to maternal sires to produce replacement ewes for their second lambing. If ewes fail to get in lamb or rear a lamb they are sold.

Conclusion

Whilst measuring lamb growth rates is a basic factor of prime lamb production, it is the small factors in combination that can make a big difference to lamb performance. To produce a highly profitable lamb in our environment is a combination of precise management strategies and top genetics. We have found it necessary to continually monitor the ewes and pasture to ensure they get to the start of lambing in the right condition with the right amount of feed.

Prime lamb production is an enterprise where we can measure to manage and given good management we end up with some very exciting results.

Measurement technologies for precision processing of lamb

Dr Graham Gardner
Murdoch University, WA.

Within the last 7 years the Australian lamb industry has taken massive steps forward in knowledge regarding lean meat yield and eating quality. This has been driven by research conducted by the Cooperative Research Centre for Sheep Industry Innovation (Sheep CRC), which has identified and quantified the key production and genetic factors affecting these traits. While industry has long known the importance of lean meat yield, and selected for characteristics to optimise this trait, it is only since the inception of MSA for sheep meat that there has been a real focus on production to optimise eating quality. This is evidenced by the increased volume of lambs being graded annually within the MSA sheep-meats program, reaching 5.5million nationally during 2012-13. None-the-less this research and the associated change in commercial mind-set has brought into focus 3 key challenges that face this rapidly evolving industry.

The first challenge is the need to evolve the MSA sheep-meats program. At present this system involves a simple “in-or-out” pathways type approach, and in contrast to the Beef MSA system it does not enable further differentiation that would allow the same cut to be classified as 3, 4, or 5*. Thus while the broad adoption of the MSA system highlights its success, it also means that once the majority are “in”, it no longer differentiates between cuts from animals of similar age. This has led to calls from industry for improvements to this program that would enable better differentiation of cuts between individual carcasses on the basis of eating quality. This would require measurement of traits such as intramuscular fat, tenderness and colour, yet the limitation is that technologies have not been developed that would enable the rapid and cost effective measurement of these traits. Once these technologies are available, this will potentiate the evolution of a new MSA system.

The second key challenge is the measurement of lean meat yield. Producers require market signals to supply high yielding lambs, but won't receive these signals until measurement technologies are in place to accurately measure this trait. Despite this, lean meat yield is still essential for producers, as it drives on-farm efficiency and makes finishing lambs to heavier weights possible without incurring penalties for too much fat. Furthermore, lamb at retail is still perceived as being an overly fatty product compared to beef and still lags on the perceived “value for money” and “health characteristics”, perceptions that need to be changed to ensure long-term demand. From the processors perspective, lean meat yield measurement and the precise prediction of cut size from carcasses prior to bone-out is vital. Most processors supply a number of different markets each of which have different cut size and trim specifications. Accurate yield prediction enables processors to optimise the allocation of carcasses to these markets leading to improved efficiency within boning rooms (ie less trimming waste and labour cost), better consistency of cut size at retail, and increased confidence of processors to reward producers with high yielding lambs. However, the main method used across industry to determine lean meat yield is based on manual palpation of the GR site to estimate fat score. When used in conjunction with carcass weight this describes less than 20% of the variation in lean meat yield, a method that is far too imprecise to make accurate carcass sorting decisions. Therefore technologies are required to enable the more precise measurement of lean meat yield, and capture the value of predicting this trait.

The third key challenge facing industry is the antagonism between lean meat yield and other economically important traits - particularly eating quality. Sheep CRC research has highlighted that IF lambs are selected for lean meat yield ALONE, eating quality diminishes. As such, selection indices will need to be carefully constructed, and IDEALLY payment systems will have to be developed to reward producers for taking a balanced approach to optimising lean meat yield while also maintaining eating quality. Importantly the effect of lean meat yield on eating quality will need to be reflected within the next generation MSA system. To enable this, measurement technologies to enhance the prediction of eating quality and lean meat yield are not only essential, but will need to be used simultaneously.

For this reason considerable investment from Meat and Livestock Australia, Australian Meat Processors Corporation, and the Sheep CRC, is being directed towards research and development of objective carcass measurement technologies. These technologies will be linked to information systems that predict carcass value, enabling carcass sorting and value determination. Some of these technologies and the traits they can measure are described in the following sections.



Mechanical probes for GR tissue depth measurement

By actually measuring GR tissue depth in millimetres, rather than estimating it through manual palpation, a marked improvement in the prediction of lean meat yield can be achieved. When used in conjunction with carcass weight approximately 30% of the variation in lean meat yield can be described. An old technology that successfully fulfilled this role was the AUS-MEAT Sheep Probe, however this is no longer commercially supported and therefore not readily available to industry. For this reason, some effort is being invested in the development of alternative mechanical probes to measure GR tissue depth.



Figure 1. Fat-o-meter tissue depth probe.

Electrical impedance probe

Work is underway to develop a custom made probe that uses electrical impedance to determine intramuscular fat content in lamb meat. Simplistically, small electrical currents are conducted between the ends of needles inserted into the loin muscle of a carcass, and the higher the amount of intramuscular fat the greater the impedance of this current. This is because fat tissue has a 10-fold greater impedance than muscle tissue. With some degree of calibration it should be possible to relate this impedance to the intramuscular fat content of the muscle. Furthermore, coupling this device with depth measurement capability should enable the same device to also measure GR tissue depth, and potentially tissue depth at the C-site (located 5cm from the midline over the 12th rib).

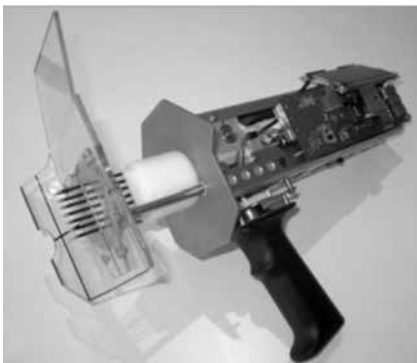


Figure 2. Conceptual impedance probe for intramuscular fat.

Hyper-spectral imaging

This system uses imaging over a large number of discrete, contiguous spectral bands such that a complete reflective spectrum can be obtained and correlated with the tissue of interest. This enables the differentiation of bone, muscle, and fat tissues within a cross-sectional image of a quartered carcass. As such it should enable the estimation of eye muscle area and fat depth for lean meat yield determination, and isolation of fat within the eye muscle for determining intramuscular fat content. It is also likely to capture fresh colour, assuming adequate blooming time has been allowed prior to imaging.

Near Infrared Spectroscopy (NIR) and Raman spectroscopy

Although somewhat more conceptual at this point, these technologies could in theory be of use for measuring intramuscular fat, shear force tenderness and muscle pH/glycogen. Although a NIR probe has been developed for use in pork, at present a close to market technology appears to be some way off for the lamb industry. They will also require a commercial provider to market these devices in Australia, and maintain them once installed.

X-Ray technologies

2Dimensional Xray imagery is currently used for identification of skeletal landmarks for directing the robotic quartering of carcasses. Work is currently underway to substitute these 2D Xray systems with Dual Energy Xray Absorptiometry systems that would still enable the robotic cutting, but would also allow the simultaneous determination of carcase composition and lean meat yield. The early development work indicates that these systems can operate at chain speed within an abattoir environment, and provide carcase composition estimation approaching that of computed tomograph scanning. Although an expensive alternative, this approach would be seamless for processors that already have the robotic systems in place.

Lastly Computed Tomography Scanning (CTscan) is currently used within the Australian research sector as the gold standard method for determining carcase composition, however to date no systems exist that are robust enough to operate in an abattoir environment. Furthermore, they are prohibitively expensive. None-the-less work continues in this area, as this represents the ultimate in yield prediction and is also likely to enable 3dimensional imaging of actual commercial cuts.

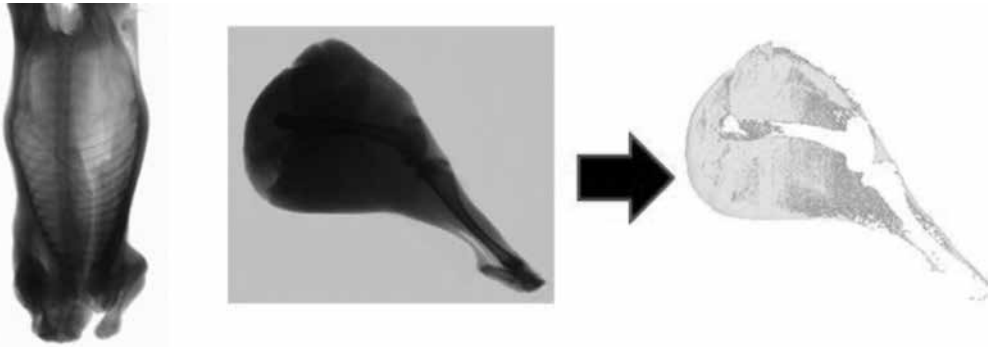


Figure 3. DEXA X-ray technologies for lean meat yield.

Conclusion

The adoption of these new carcass grading technologies into mainstream industry practice will require strategic support for prototype testing and development, calibration, and integration into the key lamb supply chains. As such, an entire project with the new Sheep CRC has been dedicated to this process of the next 5 years. This will have a strong focus on engaging the end-user in the development and testing phases of these devices, enabling the seam-less delivery of these game-changing technologies into industry.

The quantum leap of robots in boning rooms

Graham Treffone

JBS

Coming from a beef processing background it was hard to imagine how a 24 kg lamb carcass could add so much complexity and variation into a processing business.

Not only does complexity add cost, it also adds a requirement for accuracy and consistency.

From my experience most lamb boning rooms break up lambs and prepare finished products using bandsaws. Although bandsaws are deemed to be a necessary piece of processing equipment they bring with them a certain amount of OH&S risk. This risk also adds cost to processing.

In 2011, I was invited as part of a small JBS contingent to visit the Scott Technology facility in Dunedin, NZ to discuss their "Leap" lamb cutting innovation. Part of this presentation was a tour of the Silver Fern Farm process at Finnegan to witness the Scott Leap equipment in production.

This included the x-ray, Leap III cutting system, Leap leg boning and forequarter processing robots. The leap IV middles process was still under development at this stage.

At the end of that meeting we walked away in amazement of the possibilities and potential of the technology but also wondering how we could create a payback model on the investment.

Many hours were spent analysing our current production performance and establishing where we stood and where Leap could get us in yield and what that yield represented as additional revenue.

In 2012 JBS in partnership with AMPC, MLA & Scott Technology signed up to install the Leap III lamb primal cutting system and the Leap IV middles processing system at the JBS Bordertown in South Australia.

Installation began in June 2013 and commissioning of the Leap III primal system commenced in July.

The Leap IV middles process was installed in December 2013 and commissioning began in February 2014.

The commissioning of both stages is now complete and both working at full capacity.

The objectives of the project

Leap III

- To accurately dissect all lambs into 3 parts;
- Those being a 4 rib shoulder, full barrel, and a chump-on leg pair.

Leap IV

- To remove the spinal cord from the barrel;
- Accurately dissect the barrel into racks and loins;
- Accurately remove rack and loin flaps at a designated length;
- Remove the chime and feather bone from racks when required;
- Split the racks through the spinal column if CFO not required;
- Split the loin through the spinal column if required.

Expected outcomes

- To remove labour cost;
- To deliver accuracy and consistency;
- Improve safety and remove risks;
- Reduce handling;
- Reduce consumables.

How does it work?

The Leap process uses SEXA (single energy x-ray) to determine the skeletal characteristics of each individual lamb carcass as it enters the fabrication process. The individual images are processed by the software which directs the cutting robot towers to the dissection points on the carcass.

Carcasses shuttle through the system to tower #1 where the shoulders are removed as a pair. The balance of the carcass shuttles to tower #2. At tower #2 the barrel is gripped and separated from the leg pair. The barrel is transferred to the MPS (middles processing system) carousel. The leg pairs shuttle out of the system and proceed to the manual leg deboning area.

Still carrying their original x-ray data, the middles are loaded into position 1 of the MPS carousel where cameras take eye muscle size and position information. This is to determine the accuracy of flap/tail removal cut length. The carousel rotates to position 2 where the barrel is centred and the spinal cord is removed under vacuum.

At position 3 of the carousel the barrel is accurately separated into racks and loins.

At position 4 the rack pair, then the loin pair are fed into the MPS where.

The flaps are removed to the desired length.

The chime and feather bones are removed from the rack as desired OR, the rack is split into standard racks.

The loin pair is ejected in the manual process OR, split into individual loins.

All this is carried out at constant line speed of up to 10 carcasses per minute.

R& D Hurdles

R&D support on this project has been fully justified. The variation in the size, weight and breed of Australian lamb carcasses has presented the project with a number of challenges that JBS has identified and which Scott Technology has had to deal with.

Today the Bordertown plant runs at process speed up to 10 lambs per minute, a constant speed, delivering cutting accuracy, consistent presentation, improved safety with less risks and less labour units.



Building the Lamb Value Chain of the Future with the Young Guns

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The White Suffolk Association's Young Guns program saw youth of the Australian Lamb Industry invited to share their experience, project, research, study, thoughts and ideas covering any activity along the whole lamb value chain.

Examples included on-farm producer group projects / activities, research development and extension projects, genetics, animal production, pasture & grazing management, marketing, environment, welfare, health, e-technology, and off-farm (transport, processing, storage, retail, food service, new product development, marketing and export), and social and cultural aspects and communication.

Three sectors have been showcased in this competition:

- High Schools/Under Graduates,
- Honors, MSc, PhD,
- Early career professionals - Industry, Apprentices, Scientists (≤ 30 yo at 10 July '14)

The competition generated an exceptional response and the following pages showcases the one-page papers that elevated 13 finalists to earn the right to display their work as posters and present their work to a panel of judges on May 9. The judging panel will select category winners on the basis of the combined paper, poster and a three minute presentation to the panel.

The three category winners will be introduced to the LambEx audience to explain their project to Professor Graham Gardner, Murdoch University together with Andrew Heinrich representing the White Suffolk Association, on Day 1 of LambEx.

Supporting Partners



Building the Lamb Value Chain of the Future with the Young Guns

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Name	Topic
Early Career Professionals	
Georgie Keynes Facilitator, Barossa Improved Grazing Group (BIGG), Keyneton, South Australia	The Grass can be Greener on the Other Side of the Fence
Ellie Quinn Agriculture and Primary Industries Teacher and Sheep Coordinator, Yanco Agricultural High School, New South Wales	The Role of Secondary Schools in the Prime Lamb Industry
Isaac Allen Professional Sales Representative – Livestock, Zoetis, Bendigo, Victoria	Collaborative Partnerships with Sheep Processors- 'Thinking beyond the farm gate'
Amanda Giles Animal Health Advisor, PIRSA- Biosecurity SA, Struan, South Australia	On-farm strategies to help protect Australia's lamb export markets
Emma Shattock Livestock Production Advisor, Elders Rural Services, Clare, South Australia	Meeting Genetic Potential through Good Nutrition
High School Students and Undergraduates	
Charles Rowett Student, Westminster School, Adelaide, South Australia	Producing prime lambs
Rhys Cassidy Student, Murray Bridge High School, South Australia	Putting some meat into learning
Deanna Johnston Student, Yanco Agricultural High School, Naradhan, New South Wales	Attracting Young People to the Prime Lamb Industry
Royce Pitchford Student, Urrbrae Agricultural High School, Adelaide, South Australia	Can a Quality Lamb Carcase Be Produced From a Dual Purpose Breed?
Lachlan Grossman Student, Nuriootpa High School, South Australia	The Angaston Agricultural Bureau Annual Hogget Competition and Schools Challenge
Honors, MSc, PhD	
Bea Kirk Mackinnon Project, University of Melbourne, Werribee, Victoria	Internal Parasites and the Prime Lamb Industry
Michael Wilkes School of Animal and Veterinary Sciences, University of Adelaide, Roseworthy, South Australia	Understanding variable growth performance of sheep fed poor quality feed
Caris Jones School of Animal Science, University of Western Australia, Crawley, Western Australia	Improving feed efficiency has a negative impact on the fertility of Merino ewe lambs mated at 7-10 months of age

Supporting Partners



The Grass can be Greener on the Other Side of the Fence

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Georgie Keynes

Facilitator Barossa Improved Grazing Group (BIGG), Keyneton, South Australia

Pastures play a huge role within the lamb industry with increases in pasture production relating to increased number of ewes pregnant, lambs weaned and lamb growth rates. Managing these systems in a sustainable fashion will help to increase pasture production whilst ensuring good environmental outcomes to sustain a strong future for the land and the future of the industry. Providing the opportunity for producers to have a 'sticky beak' of these systems helps to facilitate idea generation and implement adoption of sustainable pasture techniques and management options.

The Barossa Improved Grazing Group (BIGG) applies this mentality to improve pasture production and achieve on-farm NRM outcomes via projects which demonstrate that by implementing sustainable practices such as soil improvements, rotational grazing and correct pasture varieties; the grass is greener on the other side of the fence.

The goal of improving productivity was originally delivered by the Winter Pasture NRM Project, which provided the starting point for BIGG. This project, funded by the Adelaide and Mt Lofty Ranges NRM Board's 2012/13 Sustainable Industry Grant, encouraged local producers, through their livestock producer groups (North Rhine Sheep Group, Angaston Ag Bureau, Mt Pleasant Beef and Barossa Dairy Group) to develop activity plans to focus on improving sustainable pasture production.

These plans were then shared by providing sticky beak opportunities- pasture walks, bus trips and a strategic communication plan targeting the local agricultural and external community.

The Winter Pasture NRM Project provided the momentum to apply for further funding which saw, from 2012-14, eight other projects delivered across the region. This included a Caring for Our Country temporary electric fence (Rappa) system; a State NRM Community Grant which developed sustainable soil focus paddocks on dairy properties; a Caring for Our Country pasture soil moisture monitoring project; and another State NRM Community Grant which is challenging the individual producer groups to a sustainable pasture contest.

BIGG's projects are practical, aim to up-skill producers and provide an opportunity to get together, observe and discuss local issues. This creates learning opportunities for producers by seeing firsthand the benefits of sustainable farming methods- alternative manures and dung beetles to improve soil health, rotational grazing techniques, alternative pasture varieties and sowing times, measuring and maintaining ground cover, stock containment areas, weed control options- which facilitates adoption.

Common interest and focus in pastures and NRM ensures producers are engaged from the beginning of the project as they can achieve worthwhile gains on their own properties. This is relevant for all of the producer groups and provides a regional focus rather than an industry focus.

The projects are producer driven, with an active advisory committee consisting of farmers from the individual producer groups, representatives from local rural businesses and also industry stakeholders. This provides ownership and ensures events, communications and issues remain timely and relevant to the local community.

The range of projects and producer groups in BIGG has also provided opportunities and unity for a range of stakeholders including Sheep Connect SA, Dairy SA, NRM Boards, MLA, Making More from Beef Program, Rural Solutions SA and Grasslands Society SA who have partnered and provided on-going support.

In 2012/13, 60 individual producer activity plans were developed, over 250 people attended 12 events, an email list of over 150 producers and stakeholders has been developed and in 2014 BIGG won the Ag Ex Alliance Sustainability Award for the most outstanding locally based grower group. By taking a look over their neighbours' fences, Barossa producers are engaged and learning that the grass can be greener and they can improve their on farm productivity and sustainability, which will improve gains in not only the lamb, but all grazing industries for the future.

The Role of Secondary Schools in the Prime Lamb Industry

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Ellie Quinn

Agriculture and Primary Industries Teacher and Sheep Coordinator, Yanco Agricultural High School, New South Wales

The education of young people in both the 'paddock to plate' concept and in the management of prime lamb production systems is vital to the sustainability of the prime lamb industry in Australia. Secondary Schools play a fundamental role in this education. In the Review into Agricultural Education and Training in NSW, released by Jim Pratley in 2013, it was identified that the decline in young people choosing careers in Agriculture is due, at a school level, to the lack of awareness of students about food and fibre, perceptions about Agriculture and lack of quality teaching and learning materials for schools. Only one third of secondary schools currently teach Agriculture, four of which are Public Specialist Agricultural High Schools.

There is currently no published research on the perceptions of secondary school students towards lamb and mutton production. Anecdotally, many students I teach are aware of lamb products, as the majority have been exposed to chops and roast through the supermarkets, however many still assume that 'lamb' means eating 'baby animals.' The majority do not know what mutton is. Most perceive lamb to be expensive and unaffordable, and very few could identify specific careers in the sheep industry, except as a farmer. As a teacher who is passionate about the sheep industry, this is of deep concern.

The key to attracting and retaining students who are going to pursue a career in the Agriculture sector, particularly the sheep and prime lamb industry, is quality teaching programs for Years 7-12, dedicated elective and Vocational Education and Training subjects, an industry-leading sheep production enterprise on school sites, industry partnerships with leading commercial and stud producers, accurate career advice and support, followed by retention of these students at school, and transfer to tertiary education. Quality teaching programs need to be developed in conjunction with industry bodies such as MLA, Primary Industries Education Foundation, SGA and NSW DPI, that can be distributed amongst high schools, in a similar fashion to 'Cows create careers' by Dairy Australia and Australian Wool Innovation's 'Learn About Wool Kit'.

It is imperative that the students who are the sheep producers of the future are provided with opportunities for development of industry-standard management skills such as creating a calendar of operations, pest and disease management programs, ram and ewe selection, monitoring and meeting market specifications, feed budgeting and condition scoring. They must also be introduced to industry-leading technologies such as electronic identification, walk-over-weighing, autodraft, eye muscle and fat scanning, genomic testing, use of ASBVs and pregnancy scanning. However, as schools mainly rely on small budgets, topped up with donations and grants, it is very difficult to demonstrate best practice management and technology, without industry support, or commercialisation. It is also important that they experience many different production systems, such as commercial specialist prime lamb, dual-purpose, different terminal and maternal seedstock, through industry partnerships with local producers. This can be achieved through specialised Sheep and Wool courses (which are currently offered at only two Agricultural High Schools) and Primary Industries, the Certificate II and III in Agriculture.

The establishment of studs and enterprises at schools by Breed Societies is a valuable initiative, however schools require ongoing support to commercialise their enterprises where possible and manage them at an industry-leading level rather than focusing solely on traditional activities such as showing; as well-managed, commercially profitable enterprises are a far greater teaching tool than any textbook or video.

Secondary schools play a major role in educating the future sheep producers of Australia however more research and work is needed to analyse current student perceptions, develop quality teaching programs, industry partnerships, clear career pathways and assist in establishing profitable, industry-leading school commercial and stud sheep enterprises as teaching tools to help boost the flow of students into Agricultural tertiary education, and into the Prime Lamb Industry.



Collaborative Partnerships with Sheep Processors

- 'Thinking beyond the farm gate'

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Isaac Allen

Professional Sales Representative – Livestock, Zoetis, Bendigo, Victoria

Like all Australian lamb producers my future is invested in the success of the Australian Lamb Industry. More importantly, Australia's future is invested in the industry. In 2013 I was fortunate enough to represent Australia in the Intercollegiate Meat Judging Tour of America. Experiences from this international tour in combination with my career experience have helped shape my opinions, thoughts and ideas towards the Australian Lamb Industry. I currently facilitate a unique initiative; involving collaborative partnerships with lamb producers and sheep processors.

I am actively involved in this Zoetis initiative which aims to raise producer awareness around both manageable and preventable diseases affecting carcasses yield; ultimately costing Australian sheep producers. These partnerships involving Australian processors seek to provide producers with best practice information relevant to their industry, their productivity and their profitability. The capacities in which individual partnerships function vary between processing plants.

Specifically I have had a working relationship with Frewstal Pty Ltd since May 2013. This relationship involving both Frewstal abattoir and Zoetis is heavily focused around providing best practice information to clients; in turn helping make producers more profitable whilst focusing on producing and processing carcasses of the highest quality. A key feature of my working relationship with Frewstal involves abattoir tours. I organise these plant tours in conjunction with account managers in rural merchandise stores or even Best Wool Best Lamb (BWBL) group coordinators where key contacts arrange for clients or group members to attend. Producer visits involve a series of interactive discussions around manageable and preventable diseases, followed by a detailed tour of both processing aspects in which we observe boning facilities and shelf ready products destined to their respective market before spending time overseeing the processing floor; whereby carcasses are inspected by abattoir staff and if necessary trimmed before being weighed. It is here that producers are able to observe the basis of what drives their profitability; most importantly they are able to observe factors affecting carcass yield.

When producers are able to visualise their product on the processing chain they are left with a lasting impact that can change mindsets and reinforce best practice techniques. It is a valuable opportunity to be exposed to another link in the supply chain better enabling producers to identify they are producing a product destined for a specific market. In doing so, this enables them to gain an appreciation for their target market and produce a premium product that is in high demand. The benefits of this initiative are not limited to the producer with considerable benefits to Australian processors. Not only are we observing and addressing correct vaccination site and technique, raising awareness around preventable diseases and the effects of cheesy gland, Ovine Johne's Disease and arthritis upon the carcass, but also raising awareness around management issues costing producers directly in the form of grass seeds and their effects as well as bruises and dog bites incurred through transportation. This is of paramount importance because processors are being presented with carcasses that require less trimming, therefore maintaining a productive chain speed.

To date at Frewstal I have had over 70 producers representing in excess of 145 000 breeding ewes attend these tours. Other attendees include but are not limited to rural merchandisers, livestock sales managers, wool sales managers, Best Wool Best Lamb co-ordinators and their groups as well as Department of Environmental and Primary Industries (DEPI) extension officers. Producers which have attended these tours have been thoroughly impressed at the opportunity to see another link in the supply chain of their industry. Many have since adopted changes in management practices in a variety of capacities: ranging from correct vaccination site and technique to minimise site reactions, correct vaccination compliance, implementing steps to manage and prevent losses due to both arthritis and cheesy gland through increased awareness of on and off farm costs, and the effects of grass seeds upon carcass value. At the core of this initiative the long term benefit is that of strengthened relationships with Australian lamb producers and processors, enabling producers to 'think beyond the farm gate'.

On-farm strategies to help protect Australia's lamb export markets

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Amanda Giles

Animal Health Advisor, PIRSA- Biosecurity SA , Struan, South Australia

The future of the Australian lamb industry is in our hands. We must have a united industry working together to manage the risks which threaten our export markets. Maintaining and growing our lamb exports is the key driver to the success and profitability of the lamb industry. Quality assurance starts on-farm and flows through the processing and export chain. To help protect Australia's export markets on-farm producers can improve carcase quality, manage the risk of exotic disease, maintain high animal welfare standards and aim to exceed base level industry expectations.

IMPROVE CARCASE QUALITY - Improved lamb management can increase farmers' ability to meet customer expectations, through consistently producing animals which suit market requirements for carcase weight with no contaminations such as grass seeds. Isolated contaminations that could potentially be missed by abattoir quality control and reach an end user could lead to loss of consumer confidence, compensation claims and reduced market access. As an example in the local market, Andrew Hay from Coles supermarkets says "Seed infestation continues to be the biggest single industry issue facing the prime lamb industry.", "Purchasing lambs 'over the hooks' ensures producers obtain feedback on many issues, including infestation". It is important producers are utilizing this information from abattoir surveillance programs to improve management on-farm and reduce the instances of contamination. Correct chemical use and accurate record keeping is also essential in preventing contaminations.

MANAGE THE RISK OF EXOTIC DISEASE- One of the biggest risks to market access is the outbreak of an exotic disease such as Foot and Mouth Disease (FMD). An outbreak of FMD in Australia is predicted to cost the industry \$7.1 billion for a small three month outbreak and \$16.0 billion for a large 12 month outbreak (K Matthews, 2011). It is essential that farmers understand the risk of exotic disease and report anything unusual promptly to authorities. Producers should have a farm biosecurity plan and assess the risks of animals, products and people entering their properties.

HAVE HIGH ANIMAL WELFARE STANDARDS- Ensuring consumers have a positive image of the industries' animal welfare standards is essential. We must maintain high animal welfare standards on-farm and during transport. With video technology and internet access on most phones a film of an unwell animal can go viral in an instant potentially damaging the image of the livestock industry. Farmers need to be forward thinking and update management plans and facilities to guarantee welfare expectations are met. Across the industry we should be working towards having modern low stress handling and loading facilities and always destroy livestock humanely when necessary.

EXCEED BASE LEVEL INDUSTRY EXPECTATIONS - Producers should be proactive and continuously be reviewing management to keep up with industry best practice. Becoming involved with relevant on-farm and transport assurance programs can aid producers in testing for any flaws within their current management programs. Assurance programs give consumers confidence in lamb as a safe product produced under high welfare standards.

Through implementing these on-farm strategies, producers can play a key role in protecting Australia's lamb export markets.

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Meeting Genetic Potential through Good Nutrition

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Emma Shattock

Livestock Production Advisor, Elders Rural Services, Clare, South Australia

I see the Australian sheep industry as progressive when it comes to sheep genetics, and this can be seen with the worldwide acclaim that our bloodlines receive. However, to truly meet the capabilities of these elite genetics, we must rethink the way that we manage our stock, particularly when it comes to nutrition.

Too often I see ewes scanned in lamb at above average percentages, only to end up with an average result at marking. While disappointing, many unnecessary ewe and lamb deaths are seen as 'unpreventable'. We now know that managing the ewe prior to lambing can go a long way to reducing these deaths. By maintaining ewe condition score at around 3 and providing appropriate supplementation to maximise calcium mobilisation at the point of parturition, we can improve birth time, milk let down, mothering and lamb vigour, all of which lead to increased marking percentages and stronger, healthier lambs. After completing a condition scoring workshop with Bruce Hancock of PIRSA, I have used this tool to assess the level of supplementation required to bring a ewe to lambing. In doing this I have achieved success with my clients in lifting their lambing percentages, some as much as 12% in a season.

Weaning is another key area that we can target for improvement. Traditional weaning at 4 to 5 months often results in both a drop in ewe condition over a longer lactation period as well as an inevitable setback to the lamb when it is weaned if it has not achieved maximum rumen development. Earlier weaning at an average age of 12 weeks, with correct supplementation, can create considerable efficiencies in a lambing operation that include both short term feed surplus due to ewes having a lower energy demand, as well as the required increase in the ewe's condition for the next joining. Traditionally the negative impacts of early weaning have been lamb setbacks and weight loss, but with better management of stress and diet through advanced nutrition, we can now achieve improved performance from weaned lambs. Correct nutrition at early weaning also optimises rumen development, improving life-long feed conversion efficiency.

Clients that have used good management practices along with modern nutritional supplements to manage stress find that lambs not only achieve greater weight gain to their traditionally weaned counterparts but are also easier to handle. This makes animal health treatments such as vaccinations and drenches faster and easier to administer. Lambs also react better to vaccines when their immune system is not compromised by stress.

In my region, many producers finish their lambs on stubbles. The challenge here is to maximise and maintain growth, despite limited paddock feed and health challenges including pulpy kidney and acidosis. I always begin with animal health treatments, ensuring animals are protected with a clostridial vaccination for pulpy kidney, a vitamin ADE injection to make up for the deficiencies in cereal grains and stubbles and a worm drench where required. Grain supplementation, either in a lick feeder or trail fed, helps to manage the limited stubble feed available. A quality buffering supplement with balanced vitamins and minerals allows animals to maximise growth and cope with starchy grain without developing acidosis. It is also important to balance the protein and energy in the diet with the needs of growing lambs.

Using these techniques, a lamb producer in the Mid North was able to meet market weight and age in his lambs on stubbles a month earlier than usual, providing a considerable saving in feed costs. He also noticed a reduced tail in the mob, with even lambs in the last draft reaching 52kg+ liveweight.

By identifying target areas in production, and feeding to meet the faster growth rates and production that modern Australian sheep are capable, we are able to capitalise on profits by maximising efficiency, productivity and minimising labour. Time to accept the challenge and demand more from our sheep!

Producing prime lambs

Charles Rowett

Student, Westminster School, Adelaide, South Australia

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The prime lamb industry is one of the biggest industries in Australia along with the live export market and the cattle market. One of the main focuses in Australia's prime lamb market is to be able to get the best meat and skins from the lambs. The type of ram that you chose to mate over your ewes is critical. You have to make sure that you get the rams that fit all of the criteria. One of the main things that need to be considered is that the rams have the right genetics so that the farmer can get the most out of the ewe and the lamb. To get the right genetics and breeding, farmers can use a guide called Lambplan which allows farmers to know which rams have the best growth rates, the birth weight, the carcass measurement, the EMD, and many more but these are the main ones that will help you succeed in producing prime lambs.

When producing prime lambs it is an essential to have rams with a low birth weight and high growth rates so when the lamb is born the mother doesn't waste very much energy giving birth to the lamb and then the lamb has enough strength to be able to get a drink of milk and to survive for the first 48 hours of its life. Then after this the growth rates still play a major role in the lambs life but then the muscle and carcass percentages start to play their role in letting the lamb get stronger and stronger as it gets older then it can start producing muscle which is key for the farmer so that he can make a profit off of his lambs.

It is also critical for the farmer to manage his ewe mobs very carefully to reduce the risk of mis-mothering when the lambs will become very vulnerable to predators such as foxes and wild dogs. The best way to do this is to run the ewes in mobs of 80-100 and to have controlled baiting and culling programs to reduce the risks of predators so that if a lamb does get lost from its mum then it may have half a chance of finding its mum if it is strong enough which relates back to getting the right rams with the right genetics.

Another thing to be aware of when producing prime lambs is to make sure that the ewes are getting enough of the necessary nutrition so that they can keep on producing milk for the lamb and most importantly allowing them to keep the lamb alive when it hasn't been born yet. This is critical because you don't want to have the ewes aborting their lambs 3 weeks before lambing and you don't want the ewes not to have enough milk to raise the lamb/s otherwise the ewe will either use all of her fat reserves to look after the lamb, but if she does this then she puts herself in danger of dying, which is really bad because the farmer will lose a ewe and a lamb. If the ewe doesn't produce enough milk the worst case scenario is that the farmer only loses a lamb.

When the lambs are weaned the main thing that needs to be done is that you need to make sure that they are getting the right feed requirements so that when they are ready to be sold at 14-16 weeks of age they have a very good carcass on them which comes back to your genetics and the managing of the ewes when the lambs are younger. This will maximise your return from selling the lambs and it will also let the farmer have a reasonable profit from the lambs once all of the managing costs have been deducted.

Overall there are many aspects that need to be looked out for when producing prime lambs, it isn't just the case of buying any rams and putting them in with any ewes and hoping for the best. If you want to be successful in producing prime lambs then you will have to put the time and effort into picking the right genetics and managing the flocks in the appropriate manner. These things play a major part in making the end product a success.



Putting some meat into learning

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Rhys Cassidy

Student, Murray Bridge High School, South Australia

Roper Road Farm, home of the Murray Bridge High School Agriculture and Horticulture program now has a White Suffolk Stud. As young lamb producers we are keen to share our pride and joy, the Roper Road White Suffolk Stud (Flock number 824) project at our school with you. Our vision is to stimulate learning, understanding and skills in sheep husbandry at the production end of the lamb value chain to assist in the marketing, sale and consumption of choice White Suffolk lamb meat at the other end.

The big framed ewes purchased from Burwood in 2013 have been inseminated with quality White Suffolk genetics from Finger Post, Illoura and Ella Matta. With the increase in global population and the establishment of free trade agreements with Asia and growing Asian demand the time is right to educate young guns about Food Production in general and lamb meat in particular.

In 2014 our ewes were placed in three mating groups by a small group of year 12 students, including Rhys Cassidy, Fintan Heaney and Jennifer Whitehead using LambPlan parameters, including body weight, C+ index, multiple births and age to make the three groups as even as possible. Brecon Breeders were then engaged to laparoscopically inseminate the three groups. This was successfully completed with students participating alongside the Murray Bridge Vets to place CIDR's in the ewes, and remove them 12 days later and then inject PMSG. A teaser wether had been prepared with Ropel and when the CIDR's came out he was placed in the same paddock as the ewes to stimulate ovulation. On the 26th of February the senior students observed the Vet Margie Trowbridge closely to understand the insemination process. The ewes were pregnancy tested by Paul Cousins 72 days after the insemination. All ewes were in lamb with 35 lambs in total.

The year 12's and I are now investigating the gestation length, multiple births, the effect of CIDR loss, the relationship between body weight and twinning, and how effective laparoscopic insemination is.

We are seeking to establish partnerships with the lamb industry to build the capacity of our project. We aim to build the genetics and improve the characteristics of our sheep. As more information about the sheep genome becomes available we hope this will include selection for the taste and health value of the meat from the White Suffolks. It would benefit us greatly if the meat that we are producing meets the taste requirements of consumers.

By using LambPlan we are also trying to improve the characteristics of the body weight and growth rate and survivability of the lambs from the Roper Road farm. If the white Suffolk sheep have a good growth rate, this would benefit us as the sheep would grow faster and gain more body weight along the way. Another characteristic we are trying to improve is the length of the sheep. We are trying to have the length of the sheep good enough so that Sam Kekovich might actually get an extra chop for his barbie. We are also trying to improve the characteristics of the eye muscle size. This will improve the dressing percentage.

We commend our project to you and look forward to a productive partnership with the Australian White Suffolk Association, lamb producers and consumers in the future.

Attracting Young People to the Prime Lamb Industry

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Deanna Johnston

Naradhan, Student, Yanco Agricultural High School, New South Wales

There are many factors that affect young adults seeking careers in the prime lamb industry. Young people are out there today looking to get into farming; however, not many of them are in the prime lamb industry. The primary industry sector needs to find a way to encourage young adults who are interested in prime lamb to become part of this growing area of the Australian agricultural industry. Some of the obstacles that are currently preventing entry into the industry by Australian youth include, an increase in the mean age of farmers, the global demand for prime lamb meat growing, the lack of financial help that young adults receive when starting a business and the risk of losing their enterprise.

The average age of farmers is increasing with not many young adults taking hold of the reins and carrying on the occupation and responsibility. Increasing the number of Younger farmers entering the industry is the key to reversing this trend, as they will have new ideas and can continue to take the industry forward. The Bureau of Statistics shows that the average age of farmers in 2011 was 53 years of age and is getting older whereas the average age for other occupations is 40. In conjunction, 23% of farmers are over the age of 65; this means this occupation is an aging one.

In order to reverse this trend, the barriers that prevent younger farmers entering the industry need to be removed. A barrier that is stopping the reversing of this trend is it's getting progressively harder to start your own farming enterprise as property values have increased and there is very little government financial support for young adults to pursue their dreams of owning their own property. Currently the only possible means of young people owning land is with substantial family financial support, succession planning or inheritance. The risk of losing all their investments in beginning a new farm is holding young people back, although they are risk takers, losing their investment is too large a risk. A way in which we could attract young farmers into the prime lamb industry is to have these issues raised on a political platform so that owning a property for young people becomes a reality. To help this, the government or prime lamb sector needs to give financial benefits to those wanting a career in this industry. Young people base their knowledge on facts and objectives therefore there needs to be a clear vision of the benefits in the prime lamb industry. Having more young guns in the industry will boost the economy and boost the prime lamb production.

Australia is one of the main countries who are relied upon for the export of lamb and mutton. This makes the prime lamb industry highly valuable and indeed very important. Trends show that the value of the prime lamb industry has grown dramatically in the past 10 years and, I believe, this industry has the potential to grow further by engaging young people in the industry through the use of more efficient and effective means incorporating technology. At the moment, only 12% of the sheep population is used for prime lamb production. If no young adults take over the prime lamb industry, the world will starve. This industry is feeding the world, we need it to continue and grow.

I believe the use of technology is the way to attract young people into the Prime lamb industry. We are advancing with the technology and we are basing our lives around it so this is where the prime lamb industry could make an impact on young adults. To use technology to our benefit we need to base it on objective measurements and analysis e.g. ASBV's and pregnancy testing. We could also have phone apps that could improve the efficiency of farming and make it easier for farmers to control their enterprise. Financial benchmarks need to be put into place so that things such as the live export ban and drought conditions wouldn't be such a burden and wouldn't diminish the profit margin of the producer.

The prime lamb industry needs more young guns in it to make it more successful and more productive. We need the younger generation and older generation to work together. With the young guns being tech savvy and the older ones rich in experience, together we could make the prime lamb industry be profitable by minimising the losses through the experience of the previous generation. By decreasing the factors that are holding young adults back from coming into the prime lamb industry it could grow effectively.



Can a Quality Lamb Carcase Be Produced From a Dual Purpose Breed?

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Royce Pitchford

Student, Urrbrae Agricultural High School, Adelaide, South Australia

My name is Royce Pitchford and I'm from Echunga in the Adelaide Hills. I go to Urrbrae Agricultural High School at Netherby (Adelaide) SA and I'm in year 12 and aiming to study Agricultural Science at Adelaide University.

Dual Purpose breeds don't appear to be very useful if the breeder is just looking for the carcase or just the fleece, but if a balance is required then it can be a worthwhile option, especially in higher rainfall environments. Some examples of these breeds are, Polwarth, Dohne, SAMM, Corriedale, Border Leicester, and common in New Zealand are Romney and derived breeds such as the Coopworth which are unfortunately seasonal breeders.

Lamb breeders really want to sell lamb that grows fast, is well muscled, has good intra muscular fat (IMF), tastes good and is a twin or triplet so we get more lamb per ewe and per ha. There are other pieces to the puzzle but that sums it up well. However there are three main sides to the sheep industry that you get paid for and that is wool, lamb and reproduction. Most people would like sheep that grow like a Poll Dorset, have a fleece of a fine Merino, have reproduction traits like a Coopworth and it has to be resistant to worms and footrot all whilst it has to be fairly easy care and docile. It is also important that they have a good skin value, lambs can be born easily and survive well. We would also like to have sheep that don't need crutching and tailing. All this however can't be done currently but there are Dual purpose breeds that cover the main three points which are growth, wool and reproduction.

Current day markets pay a premium for growth/meat production as higher growth means less feed used and the market buys on weight. A good carcase or a good lamb ready for slaughter needs to grow fast because we want lambs to get from birth to slaughter as quick as possible on minimal feed. It needs to carry good muscling as we all want to have a loin chop that carries mainly meat as opposed to bone and fat. Fat distribution is another key point in a carcase as we want evenly spread surface fat as well as IMF to improve meat taste and quality.

Dual purpose sheep breeds offer a fleece of significantly higher value of \$8.50/kg (approx. value of 25mm) than a meat sheep (e.g. Poll Dorset, White Suffolk) and a better carcase than a Merino. It isn't a very smart business move to run a flock of straight White Suffolks or Poll Dorsets if you're not going to sell rams or a straight fine wool Merino flock. This is because the financial benefits in running something like first cross ewes and getting a fleece value has higher returns than what a higher growth rate would, all while producing good lambs. Therefore a more reliable income of wool and meat is obtained.

Reproduction may have an effect on how the animal grows as twin lambs don't grow as fast as singles but you will get more sheep as lambing rates increase. Dual purpose sheep however don't grow as fast as terminal breeds but still grow at reasonable rates, have good lambing rates of +125% and have a good fat distribution compared to muscle however with some variation. An advantage of dual purpose sheep are options for ewe lambs that can be sold as prime lamb or kept as replacements. This flexibility helps adjust to variable seasonal and market conditions.

One good bonus from having a self-replacing flock is more reliable biosecurity on farms as there are less sheep coming into the farm. There is also a good option to improve animal welfare by selecting sheep to have less breech wool, less belly wool, footrot resistance and shorter cleaner tails. I have talked to a New Zealander scientist who has done this using mainly an East Friesian bloodline.

A Dual purpose breed could easily replace a first cross ewe and be crossed with a terminal sire and produce good lambs but could it by itself and match growth rates of terminal breeds? The short answer is no, but given time they could be genetically bred to gain higher growth and lambing rates whilst keeping wool type and quality (low micron). This would be done through using ASBV's and selecting for higher growth (WWT, PWT) whilst keeping BWT near zero. However, if it was only growth that was focused on it would soon become a terminal sheep as well. Thus, it is important to keep high levels in wool (FW and FD), reproduction (NLW) and worm resistance (WEC) traits to save money and increase production. There will never be a perfect sheep that has good levels for all traits so breeding dual purpose sheep is difficult. It is important to keep a balance in the levels of all traits and focus on selecting for overall profit.

In conclusion, with careful breeding there is the opportunity to maintain biosecurity and have sheep that will increase profit by producing new generation dual purpose sheep that combine wool, reproduction and meat.

The Angaston Agricultural Bureau Annual Hogget Competition and Schools Challenge

Proudly sponsored by



Lachlan Grossman

Student, Nuriootpa High School, South Australia

I am Lachlan Grossman and I am 17 years old and I live on a farm just out of Angaston in the Barossa Valley and I'm currently a student at Nuriootpa High School and a member of the Angaston Agricultural Bureau which is the oldest Bureau in Australia (126yo) and currently has over 40 members. As a Bureau member I have regularly attend meetings, volunteer on wood cuts / fundraising and I have also attended different pasture walks that the Barossa Improved Grazing Group(BIGG) www.bigggroup.org.au have organized.

I attended this year's 23rd Hogget Competition at Keyneton Oval as a participant in the Nuriootpa High School Team and along with four other students representing Nuriootpa High School, we won the "School Challenge"! There were about 50 students present from Birdwood, Kapunda, Faith and Nuriootpa High Schools.

In the "**Schools Challenge**" we were instructed in how to assess and judge Merino ewe hoggets. The Teams had to look for nice white and soft wool, good crimp, also a good open face so it doesn't get wool blind, good size of hogget that stands square and has a square and full hindquarter on a well fleshed carcass. They must also be good on their feet/pasterns to hold their weight and to get around the paddock. We checked their mouths to see that teeth meet the pad properly. This is so they can eat properly.

As a group we had to discuss and agree on which we thought where the top four pens out of six and put them in order of first, second, third and fourth and also write why we put them in the order we did. Afterwards we also had to do a verbal presentation as to why we put the pens of hoggets in the order we did. We nominated one person to do this from our group.

We were also given a talk by AR Rhodes (a Wool Company) about wool and its micron and the different strengths of wool. We could examine about six different lots of wool with different micron and whether it was sound, tender, strong etc.

We also had a careers talk by a group of three people and we went around the students to see if people had careers sorted or they had not chosen a career yet. Students also discussed why they were at the hogget competition and what they could take away from the day in knowledge and friendships to help in the future.

The Schools Challenge helped me gain more knowledge and refined my skills of picking sheep out of a group and putting them in order.

In the actual "**Hogget Competition**", local producers displayed 20 pens containing three ewe hoggets each. There were three different sections; the Angaston Bureau, later lambing, and an open section. The Hoggets were scanned this year by Cousins Merino Services for muscle, fat cover and the micron of the wool with a mid-side wool sample taken.

Then there was a Hogget of the Day for each section. This is a single sheep/hogget out of a pen of three which meet all the criteria, and then one goes on to become the overall Open Hogget of the Day winner.

While the hoggets are being judged there is usually a 2 hour workshop or demonstration. This year it was called "**Sheep Handling Made Easy**" and 8 local producers demonstrated their sheep handlers so we could see how they all compared to each other and how hard or easy they were to use. It was also easy to see the OH&S of the Handlers. They were very interesting and it was good to compare them in one place.

I picked up points on how the sheep handlers all work and could see if one would suit our family enterprise and if it would work at home. Whether it is a portable one or a semi-permanent one we could have set up in or by the yards. This also will help me in my Certificate 3 in Agriculture that I am doing at the moment which comprises of Livestock, Viticultural and Broadacre cropping and is part of my Year 12 SACE. After finishing it I will most probably go home and work on the family farm full time. At the moment I currently run the Koonawarra Border Leicester Stud and show them at country and Adelaide Show while my parents and brother show our White Suffolk Stud team. I still ask Dad for guidance but I do the first sorting in culling and keeping the ewes for mating's and also work out what sires to use at mating and do the record keeping on paper and in Lambplan and assist with scanning of the sheep.



Internal Parasites and the Prime Lamb Industry

Proudly sponsored by



B Kirka, John Larsena, Norman Andersona

Mackinnon Project, University of Melbourne, Werribee, Victoria 3030

Internal parasites are estimated to cost the Australian prime lamb industry around \$90 million in lost production and cost of treatments (Sackett, Holmes *et al.* 2006).

There are inherent differences in sheep meat flocks compared to Merinos (Carmichael 2009) which necessarily lead to differences in worm control programs, including:

- All-ewe flocks, so the majority of the flock is under physiological stress (pregnancy and lactation) at a time when feed is often limiting;
- Ewes are often joined as hoggets, whilst their immune system is still developing;
- Later weaning of lambs may lead to production loss if drenching is delayed, and
- The aim in sheep meat flocks is growth, rather than maintenance (as in wool systems).

A multi-centered project, funded by MLA, has begun in eastern Australia and aims to:

- Quantify the efficacy of currently recommended worm control programs in Prime Lamb flocks, and
- Devise guidelines for effective worm control strategies in Prime Lamb flocks to reduce production loss and mortalities.

The efficacy of existing south eastern Australian worm management programs in prime lamb flocks has been measured by comparing sheep in two treatment groups on four properties in western Victoria. Measures include ewe body condition score, dag score and lamb weight and growth rate. In the first two years of this three year project, a drench resistance test was conducted on two of the four trial properties. Coopworth, Maternal Composite and first cross ewes were then run under either recommended or 'regionally typical' worm management programs and compared to ewes in the same mob that were worm suppressed from pregnancy scanning. These ewes' lambs were assigned to groups and treated with either a long-acting injectable drench or according to the farm's existing worm control program. This identified the effects of worms in the lambs themselves and the effect of the ewes' worm burden on their lambs.

In the first two years of the project:

- There was an average of a 2.5-4kg penalty in bodyweights of non worm-suppressed ewes between pregnancy scanning and joining;
- Worm suppression of ewes had a variable impact on lamb weight at weaning;
- Worm suppression of ewes had a variable effect on lamb marking percentages;
- Worm suppression of lambs at marking did not have a significant impact on their weight up to around five months of age, and
- Nutrition played a significant role in ewe and lamb bodyweight and the effects of gut roundworms were often worse when nutrition was limiting.

Whilst there is one more year of this project before its completion, results so far indicate that there was a penalty from roundworms in ewes even in flocks with fairly good worm control. However, the impact of worms was rarely statistically significant in lambs and would certainly not have justified the treatment of all ewes or all lambs on the trial properties with long-acting drenches.

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Understanding variable growth performance of sheep fed poor quality feed

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Sheep in commercial production systems typically progress through seasonal changes in body condition and weight as result of changes in feed quality and quantity. Producers report variation between sheep in their ability to maintain body condition, or 'do-ability' during these times of restricted nutrition. Little is understood about the underlying physiological factors and their interactions in relation to the variation in 'do-ability' within a sheep flock.

This experiment aimed to investigate the effect of restricted feed quality on body weight change of 18 lambs from three breeds: Meat master (MM), First-cross Border Leicester Merino (XB) and Merino (MO), and ascertain which physiological aspects are enabling differences in maintenance of bodyweight to occur. Six, 10 month old wethers of each breed were housed individually indoors for 45 days and fed a low quality pelleted ration of approximately 7MJ ME/kg and 7% CP. The nutritional regime imposed resulted in a 330g/day range in average daily gain (ADG), which was positively correlated with the 1.45kg range in daily feed intake. There were no significant breed differences observed in either trait. An 'Adjusted' feed intake value was calculated for each sheep based on their trial mid-weight and ADG to allow any differences in intake (and thus growth efficiency) at a standard weight and level of gain to be determined. These calculations revealed a 482 gram/day (3.4MJ) range in adjusted feed intake.

In order to explain this variation in feed requirement, adjusted feed intake was compared with the other traits measured. A strong correlation was observed between adjusted feed intake and energy digestibility, with energy digestibility increasing by 24.9% over the range of adjusted intake measured. The reduction in digestibility as intake increases is well known (Lourenco *et al.* 2010; Wilkes *et al.* 2012). The large variation in energy digestibility at a given weight highlights the potential for significant variation in rumen size, particle mastication and/or rumen microbial population.

Adjusted feed intake was also correlated with basal plasma levels of Tri-iodothyronine (T3), with plasma levels exhibiting a four-fold increase over the range of adjusted intakes measured. It is thought that it best to use measures of T3 as an indicator of total energy expenditure rather than basal metabolic rate alone (Kim 2008). The reduced energy expenditure potential of the low intake sheep in this experiment are thus representative of a lower metabolic rate and/or activity level.

When fed a low quality diet, low adjusted intake animals appear to increased digestive efficiency, enabling energy intake to be maintained. These low intake individuals also tend to have reduced energy expenditure as a result of lower metabolic rate or activity, thereby conserving greater energy for maintenance and growth. These findings highlight the potential for within flock variation in 'do-ability' and provide an insight into the potential mechanisms which enable these differences to occur. Under restricted feed quantity these differences are likely to exacerbate and may confer a selective advantage to those individuals with a lower intake. Increasing the incidence of 'low' adjusted intake sheep within a flock will increase the efficiency of feed utilisation and reduce supplementary feeding requirements. Further investigation into the role of intake, digestive efficiency, thyroid hormones and resultant growth is warranted to determine the optimum means of selecting for these more efficient individuals.

We are continuing to work on the effect of initial condition, metabolic rate, appetite and digestive efficiency have on sheep 'do-ability' and the role that these physiological measures play in improving the selection of efficient sheep.

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Improving feed efficiency has a negative impact on the fertility of Merino ewe lambs mated at 7-10 months of age

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To meet increased market demands for lamb from lower ewe numbers, sheep producers need to increase productivity and decrease feed costs. This could be achieved by improving feed efficiency by selecting for lower residual feed intake (RFI). Residual feed intake is the difference between an animal's actual feed intake and expected feed intake given its body weight and growth rate (Koch *et al.* 1963). An animal that is more feed efficient will eat less than expected and have a low or negative RFI. Information about how RFI is related to other sheep production traits is limited. There is evidence that more feed efficient cows tend to be leaner, and it is known across species that low body fat can have a negative impact on reproduction performance, particularly in young animals (Gernand *et al.* 2008; Shaffer *et al.* 2010). It is likely that similar relationships exist in young sheep. We hypothesised that ewe lambs with lower RFI will be leaner and less fertile than ewes with higher RFI when mated at 7-10 months of age.

Two hundred and twenty four Merino ewe lambs were measured for RFI, body composition and reproductive performance. Feed intake was measured daily and live weight twice weekly over 56 days when the lambs were 6-8 months old. RFI was calculated using the methods described by Knott *et al.* (2008). Body composition was determined by ultrasound for eye muscle and fat depth at the C-site using the technique defined by Russel *et al.* (1969). After fourteen days of teasing the ewe lambs were syndicate mated in mid-February for 5 weeks at 7-10 months of age. Average live weight at the start of mating was 47.8 kg and live weight ranged from 30 kg to 61 kg. Fertility was determined by pregnancy scanning 45 days after the rams were removed from the flock.

One hundred and twenty of the 224 ewe lambs were scanned pregnant (51%) and there was no significant relationship between live weight at the start of mating and fertility ($p>0.05$). However, fertility increased with increasing RFI. An increase of 0.2kg/day in RFI increased fertility by approximately 6% ($p=0.02$, Fig. 1).

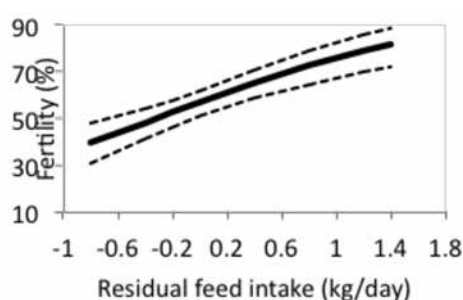


Figure 1: The relationship between residual feed intake (kg/day) and fertility (%) for 224 Merino ewe lambs mated at 7 to 10 months of age.

Merino ewe lambs that were more feed-use efficient were less fertile when mated at 7-10 months of age, however no differences in body composition were detected via ultrasound measurements at the C-site. The relationship between RFI and fertility is important because it highlights the trade-off between selecting for feed efficiency on the reproductive performance of Merino ewe lambs. Producers who are moving towards breeding ewe lambs may need to consider their breeding objectives carefully to account for the antagonistic relationship between feed efficiency and fertility and its impact on whole flock efficiency.

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Australia's Best Lamb Competition

Rules & Conditions of Entry

Closing Date for nomination forms and payment: Monday June 2 at 9am
Judging: 9am, July 9 at Regency TAFE

Aims of the Competition

1. To promote the Australia's Best Lamb competition at a State and National level.
2. To increase consumer knowledge of the benefits and varieties of lamb products.
3. To promote and enhance pride and skill amongst Lamb Producers, Processors, Wholesalers and Retailers.
4. To capitalise on the popularity of lamb products and increase sales and profit from them.

Conditions of Entry

1. All exhibits must be 100% Australian Lamb, as defined.
2. Entrants may enter multiple entries in each category.
3. Entrants will be responsible for ensuring their product(s) comply with legal requirements specified in the Australian Food Standards for the Hygienic Production and Transportation of Meat and Meat Products for Human Consumption (AS 4696:2007).
4. Products in all categories must be commercially available.
5. Each entrant is responsible for all costs of the products supplied.
6. Judging will be based on the judging criteria. The judges' decision will be final.
7. All entrants must be willing to participate in publicity surrounding the competition.
8. The LAMBEX organising committee accepts no responsibility for any loss or damage to entries or to entrant's chances of winning the competition for whatever reason.
9. Promotions / Advertising and any other publicity must clearly identify the winner and the competition year as '2014 Australia's Best Lamb Competition'.

Entry Fees

1. Entrants must pay the entry fee at the point of lodgement of nomination.
2. The entry fee is \$80.00 inc GST per entry.



Competition Procedures

Entrants are required to abide by the following competition procedures;

1. Entrants must provide two (2) whole 8-rib racks which are from the left and right hand side of the same Lamb carcass.
2. The racks should be French trimmed with the chine off and the cap removed.
3. The racks have to be vacuum packed with competition code label and the kill date. The packs should not have any company identification.
4. The racks will be cut by the competitions organisers.

Judging Criteria

All entries will be judged and scored on the following criteria;

The winners in all six classes will be re-judged to determine the overall winner.

1. Uncooked Product

Visual Appearance / Texture	Maximum Score: 20 points
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2. Cooked Product

Juiciness	Maximum Score: 20 points
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Aroma	Maximum Score: 10 points
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Flavour	Maximum Score: 20 points
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Tenderness	Maximum Score: 20 points
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Overall Liking	Maximum Score: 10 points
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OUR PARTNERS:



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