

Make a difference to food production internationally using science & technology

Productivity, genetics & farmers

Nexus Project: Transformational Options Series

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Productivity, genetics & farmers

What are we trying to do here?

Adaptation

- Industry level - Productivity in sheep
- What drove the change?
- Context of farmer response

What might we take from this?

What are we trying to do here?

- We all have a view of the future but our views vary
- These views inform how we think about things & maybe act
- Climate perspective – much more variability
- Nexus presentations – help consider various aspects & options

Adaptation

- **Why adapt?**
 - *survive- keep the farm - profitability*
- **Why look at productivity in the past?**
 - *see how people responded to shocks*
- **About adaptation**
 - *hope or belief that it will be helpful*

Adaptation

Productivity response in the NZ sheep industry

– response to a series of shocks

Context of farmer response - series of shocks

The late 1970s & early 1980s

- Changes in the market – oil price shock & costs, product prices - lamb, wool, *subsidies*

The late 1980s

- Removal of subsidies, 1987, bank responses & forced exits, rise of dairying

Sheep numbers start to decline, but there are always a few people



Productivity

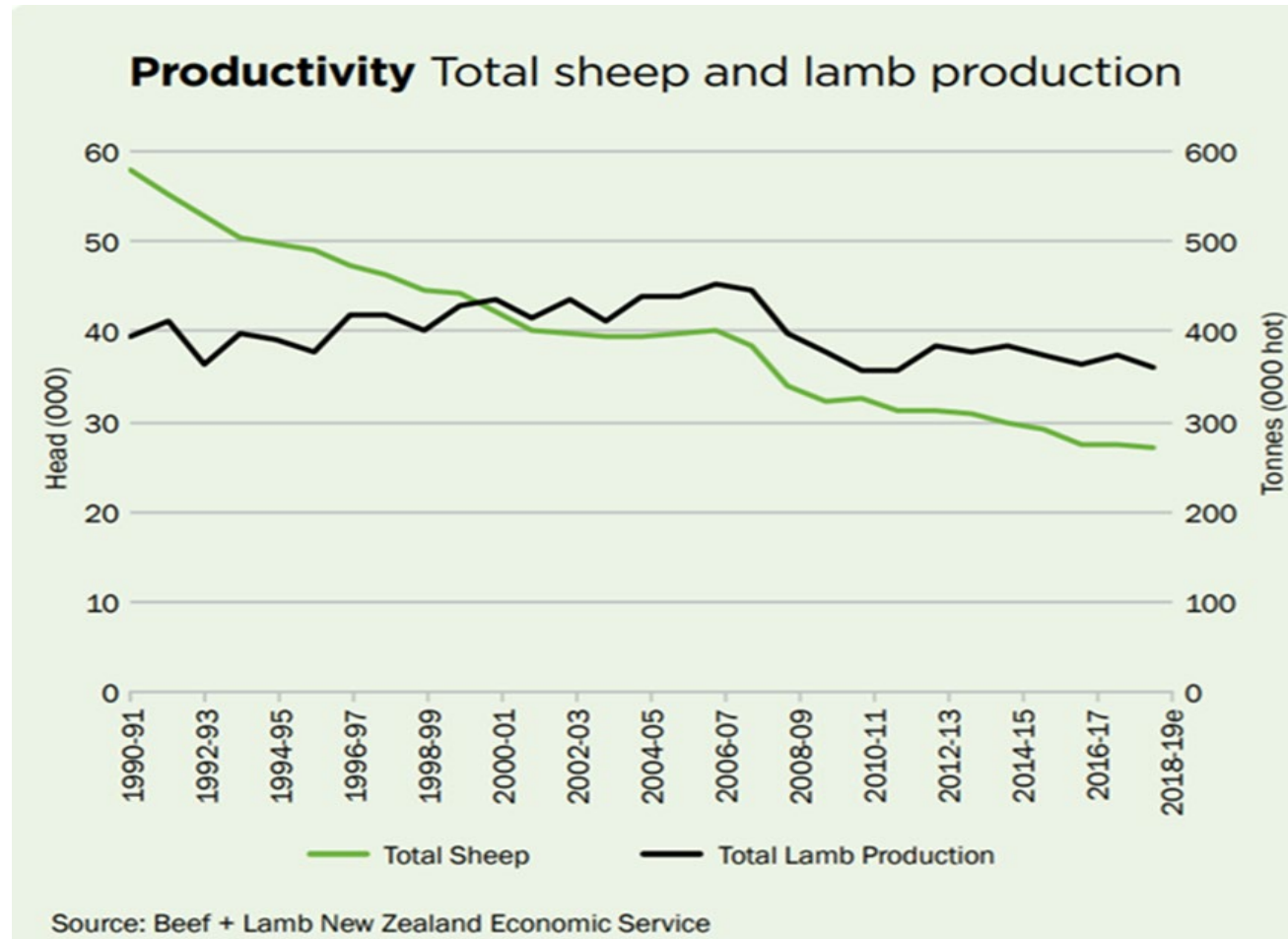
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Industry level productivity - sheep meat

Productivity = Sheep meat sold per ewe per year

Based on whole industry data - 25 years from 1990

Productivity in the NZ sheep industry #1



Productivity in the NZ sheep industry #2

Basic industry statistics

	1989/90	2014/15	Change
Land area in sheep, beef, deer (million ha)	12,600	8,500	-33%
Number of ewes (millions)	40.0	20.3	-49%
Number lambs slaughtered (millions)	28.4	21.3	-25%
Lamb meat sold (tonnes)	403,000	395,000	-2%

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Productivity in the NZ sheep industry #3

Change in productivity per ewe – sheep meat

	1989/90	2014/15	Change	Rate of gain/year
Total sheep meat sold per year (kg/ewe)	13.6	23.6	74%	2.2% (0.40 kg)
Feed intake (kg per ewe DM/year)	635	859	35%	1.2%
Efficiency: Sheep meat sold (kg per tonne feed DM)	21.4	27.5	29%	1.0%

Productivity change

We have done the analysis on productivity change

Half is genetic

Half is management

Productivity in the Australian sheep industry

Change in productivity per ewe – sheep meat

	Australia 2002 – 2012 (adjusted for change in Merinos)	
	Total sheep meat	Lamb only
Base (kg sheep meat sold per ewe per year)	11.8	8.1
Increase per ewe per year (kg)	0.28	0.14



What drove the change?

Productivity – the change for NZ farmers

The change

- 2.2% per year through genetics & management

What drove the change?

- Farmer response – genetics & management

What drove the change?

- productivity per ewe
- productivity of pasture & management
- meeting market demand & pattern of lamb slaughter

Adaptation - What drove the change? #1

Farmer response – productivity per ewe

	1989/90	2014/15	Change	Rate of gain/year
Lambs tailed per adult ewe	1.00	1.34	34%	1.2%
Lambs sold per adult ewe	0.71	1.05	48%	1.6%
Lamb carcass weight (kg)	14.3	18.6	30%	1.1% (0.17 kg)
Ewe carcass weight (kg)	20.8	25.7	24%	0.9% (0.19 kg)

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Adaptation - What drove the change? #2

Farmer response – productivity of pasture

	1989/90	2014/15	Change	Rate of gain/year
Sheep meat sold per hectare	41.6	52.8	27%	1.0%
Feed consumed by sheep(tonnes DM per hectare)	1.95	1.92		
Total feed utilized (tonnes DM per hectare)	3.16	3.47	10%	0.4%

Accounting for what land was lost, feed utilized increased about 30% per hectare

Adaptation - What drove the change? #3

Farmer response – meeting market demand & pattern of lamb slaughter

NZ lamb season

- Main lot: November to June
- Spring lot: July to October

Adaptation - What drove the change? #3

Farmer response – meeting market demand & pattern of lamb slaughter

		1989/90	2014/15	Change	Rate of gain/ year
November – June period	Percentage slaughtered	87%	77%		
	Number slaughtered (mn)	24.6	16.4	-34%	-1.6%
	Age at slaughter	202	187	-7%	
	Lamb carcass weight (kg)	14.2	18.2	28%	1.0%
July – October period	Percentage slaughtered	13%	23%		
	Number slaughtered (mn lambs)	3.6	4.9	36%	+1.2%
	Age at slaughter	307	329	7%	
	Lamb carcass weight (kg)	14.8	19.9	34%	1.2%

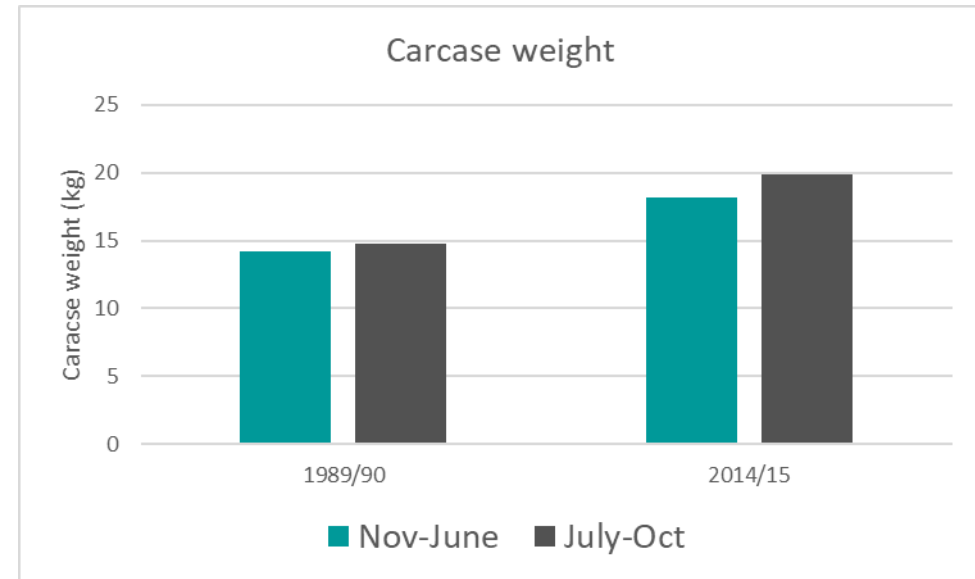
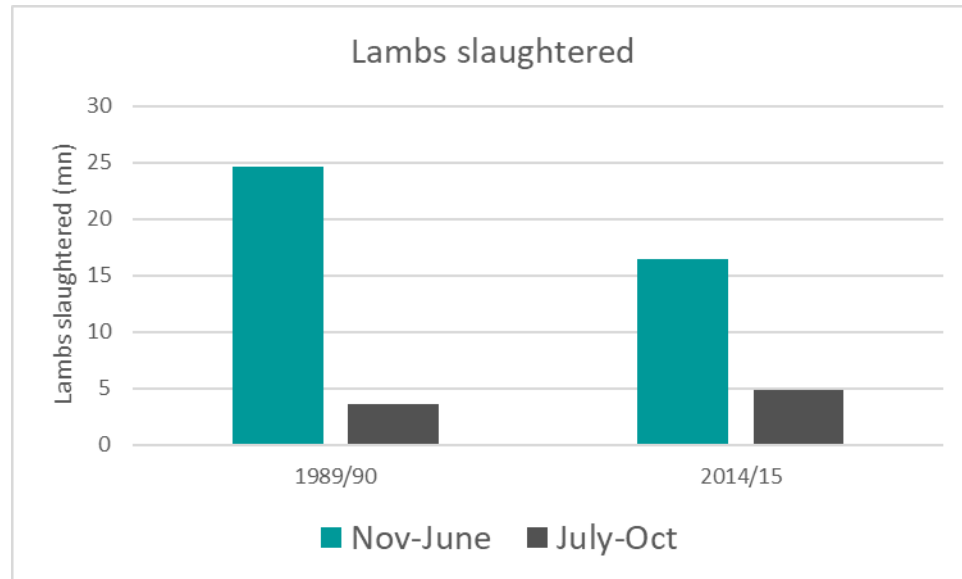
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Context – farmer response

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Context of farmer response

The growth years from 1950

1950 – 35 mn *to* 1970 – 60 mn *to* 1982 - 70 mn

- Expansion of the industry – phosphate, anthelmintics, etc
- Saw grass not sheep
- More sheep per acre – used sheep to buffer grass supply

Context of farmer response - series of shocks

The late 1970s & early 1980s

- Changes in the market – oil price shock & costs, product prices for lamb, wool, *subsidies*

The late 1980s

- Removal of subsidies, 1987, bank responses & forced exits, rise of dairying

Sheep numbers start to decline, but there are always a few people

Context of farmer response – the people

There are always a few....

- The world was changing
- So something had to change on farm
- Frustrated commercial farmers.... *breeders who related to farmers who saw sheep*
- Created a number of 'movements'
- Looked for technology – *invested, recorded performance, new breeds, found knowledge, grazing management, specialist pastures*

Context of farmer response

Genetics & management

- Genetics is an **enabler** – provides the capacity to change
- Management - the **deliverer**

The personal drivers

- Farmer response to a series of shocks
- Farmer response – invested in genetics & management

What might we take from this?



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What might we take from this? #1

Shocks

- The world is changing – climate variability & markets
- Frustrated commercial farmers – livelihoods at stake
- We have to do something on farm – how to become more resilient, robust, anti-fragile

What might we take from this? #2

What

- What can genetics do?
- What can management do?

What might we take from this? #2

Where should we focus?

- Genetics – building capacity to respond, what permanent changes do we need?
- Management – getting benefit of genetics, things that may be too slow with genetics or where good management solutions

What might we take from this? #3

Some principles?

- Need genetics & management
- Cannot expect highly-selected animals to buffer fluctuations in feed supply
- So have to manage feed supply
- Store feed or minimise fluctuations in supply with climate variability?

What new ways of thinking?

What might we take from this? #4

New ways of thinking

Consumers

- Increasing influence
- Changing preferences
- Changing markets – new customers
- Quality of products

Social licence



Summary

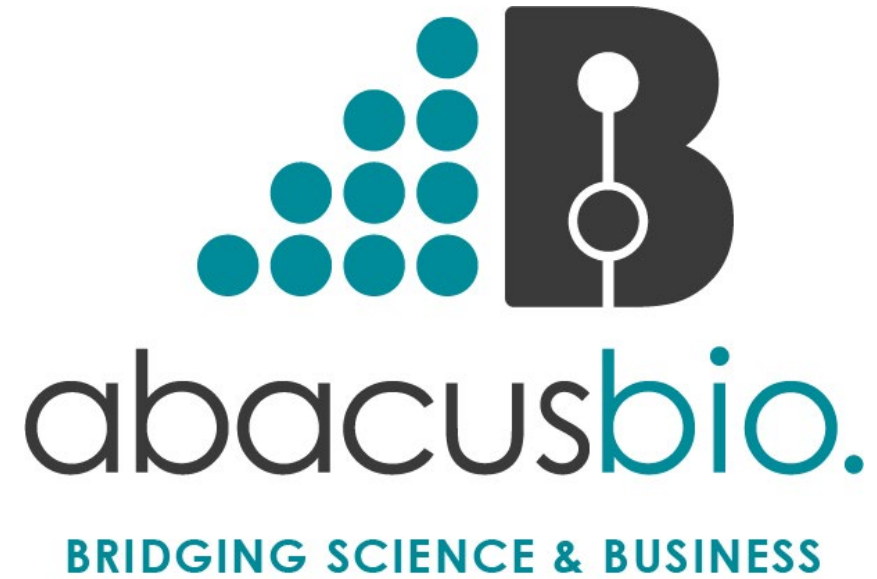
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Summary

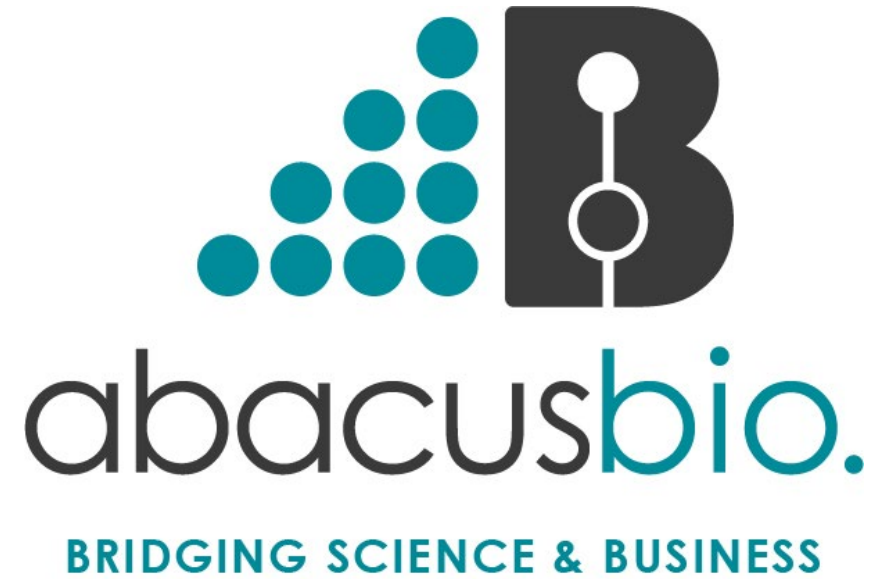
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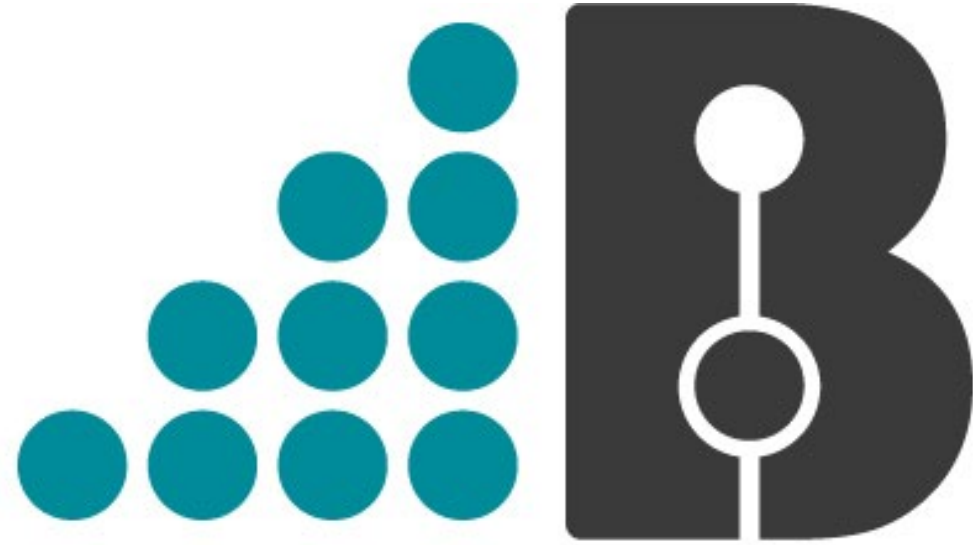


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Productivity: Australia - Southern beef

Australia: 1991 – 2012 (deleted 4 drought years)	
Base (kg beef sold per cow per year)	224
Increase per cow per year (kg)	1.60
Genetic contribution per year (kg)	1.01
Genetic contribution (percentage)	63%