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Lamb rearing options for New Zealand Dairy Sheep systems

Science to impact

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Industry Targets

A prosperous industry for NZ – key drivers

- **Happy healthy animals – animal/staff welfare & public image**
- **Profitable farming enterprises**
- **High value products and strong markets**
- **Caring for the environment**
- **Strategies for small vs large scale systems (indoor + outdoor)**

Ministry of Business, Innovation & Employment

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SPRING SHEEP MILK CO. New Zealand

Mauj

Kingsmeade Artisan Cheese

Lamb rearing systems

- 4 systems/options evaluated:
  - System 1: Artificial rearing - restricted milk feeding and early weaning
  - *System 2:* Artificial rearing - *ad libitum vs* restricted milk feeding
  - System 3: Natural rearing with early weaning
  - *System 4:* Artificial rearing - *Ad libitum* milk ± concentrate

- Focus on production outcomes (growth rates, live weights, intakes etc.) – focus of this presentation

- Also measured physiological responses, organ development, immune function, gut development, behaviour and welfare

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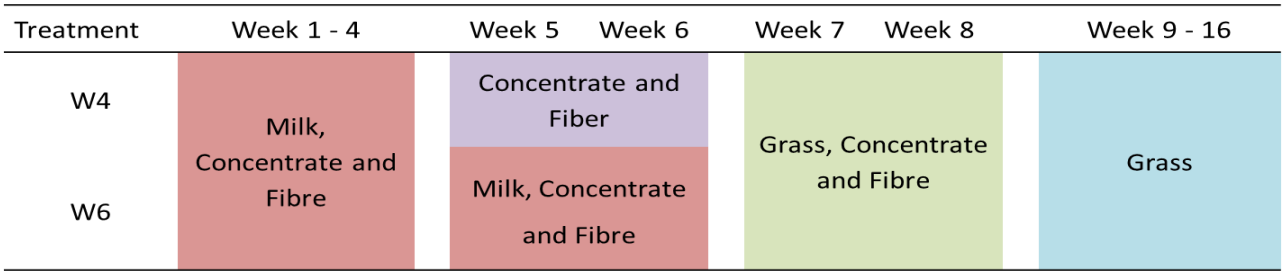
System 1 – Restricted milk and early step-down weaning

Target outcomes:

- Evaluate growth, gastrointestinal tract development, metabolic and immune function
- Development protocols for restricted milk and step-down weaning
- Potential rearing systems for replacement and surplus lambs to reduce cost

	Ultra-early weaned (4 wk); n=16	Early weaned (6 wk); n=16
Week 1	4X daily	4X daily
Week 2	3X daily	3X daily
Week 3	2X daily	3X daily
Week 4	1X daily	3X daily
Week 5	0	2X daily
Week 6	0	1X daily

- 32 mixed sex twin-born lambs (16/treatment)
- Milk - 20% of initial body weight
- All > adequate levels of GGT (colostral transfer)



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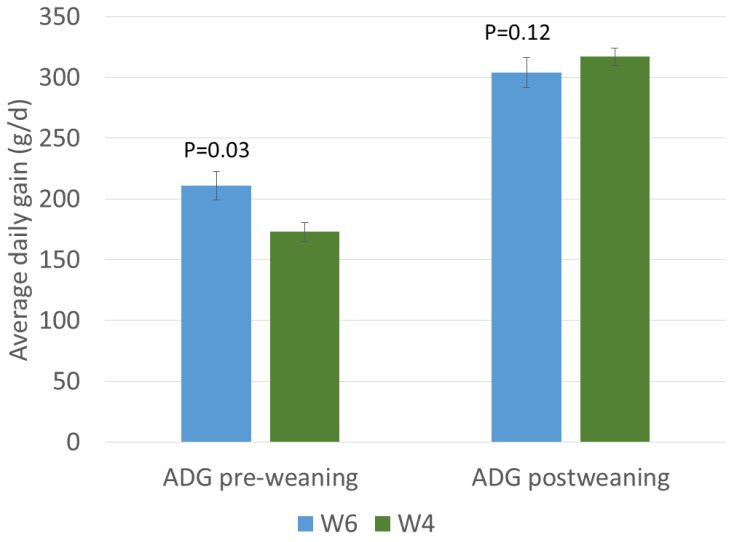

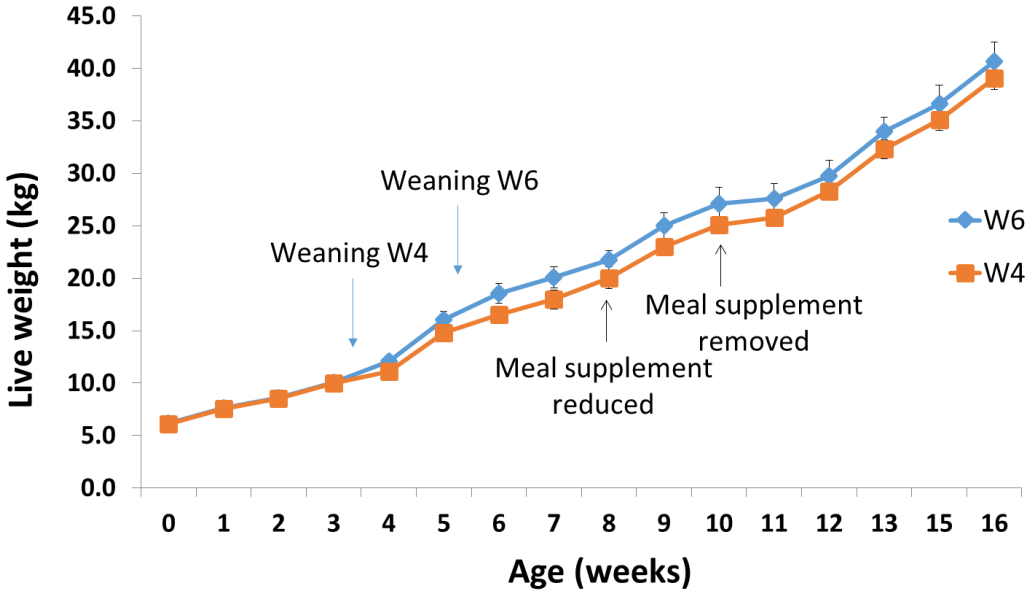

- No difference in small intestine development or immune function
- Earlier rumen development in early weaned lambs (↑ plasma beta-hydroxybutyrate)
- Adult-like fermentation patterns established and similar rumen morphology at 4 weeks

Early weaning with restricted milk + concentrate and early step-down weaning has potential to reduce costs while maintaining good levels of growth and health

Cristobal-Carballo et al. 2017 NZSAP ;Cristobal-Carballo et al. + McCoard et al. EAAP 2016 Abstracts; Cristobal-Carballo et al. JAS submitted.

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Stakeholder impact: Restricted milk feeding coupled with early weaning successfully adapted and adopted by Maui Milk

System 2 – *Ad libitum vs* restricted milk feeding with auto-feeders

Target outcomes:

- Evaluate growth, immune function, rumen and metabolic development
- Development of early weaning protocols using automatic feeders
- Potential for alternative artificial rearing systems for surplus lambs

2 treatments (n = 15 / treatment)

- Group 1: *ad libitum* milk - weaning at 6 weeks
- Group 2: Restricted milk step-down weaning at 4 weeks
- All groups a*d libitum* Lucerne chaff + meal + water

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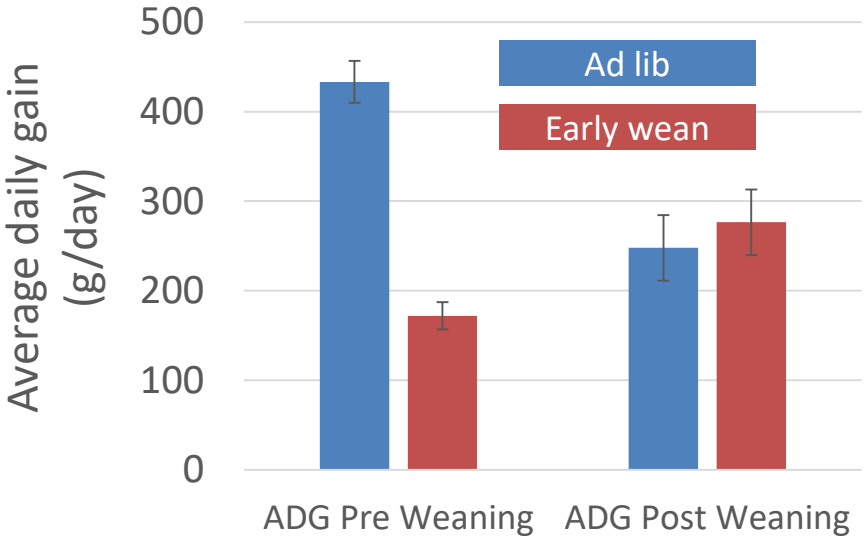
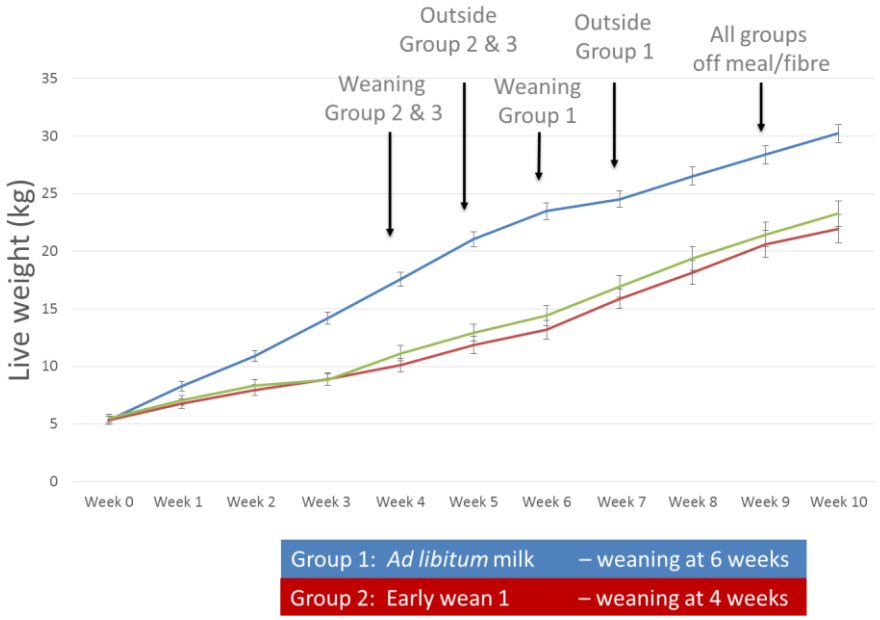




- *Ad libitum* fed lambs consumed from 32-53% of their initial BW in milk (average intake ~2 vs 0.75 L/hd/d)
- Similar fibre + concentrate intake
- 2X+ greater pre-weaning ADG - 24kg vs 15kg at 6 weeks of age
- *Ad libitum* system good for lamb growth but higher cost (2X feed cost) – lifetime benefit, metabolic health, longevity?

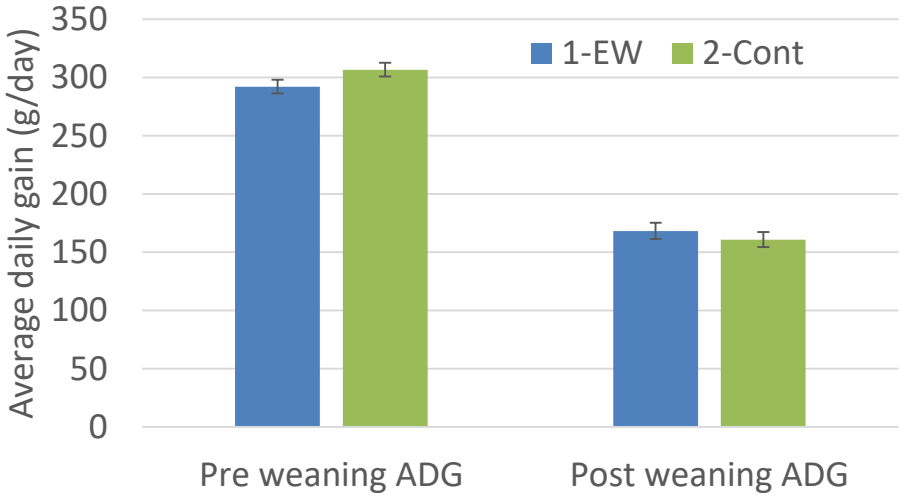
Stakeholder impact: Both systems in use by industry

System 3: Natural rearing with early weaning

Target outcome – to evaluate impact of early weaning (4 vs 6 weeks) on:

- Lamb growth, rumen/metabolic development and immune function pre- and post- weaning
- Commercial milk production + composition
- Rearing costs (additional feed)
- Practicality
- Builds on indoor systems – applied to pastoral system?

Results



- No adverse effect on lamb growth/performance
- Commercial milk production increased
- Physiological impacts on lambs and economics under evaluation

Stakeholder Impact:

- More commercial milk (+ cheese) without compromising lamb performance
- System in use by commercial operators – cost effective – need sufficient pasture
- Option for smaller-scale producers entering the industry

System 4 – *Ad libitum* milk feeding ± concentrate and post-weaning forage options

Target outcome: To evaluate the potential to simplify rearing systems, minimise weaning stress and reduce costs by removing concentrate from the system

Group 1 – current commercial system

- **Milk:** *Ad libitum* with auto-feeder (0-3 wks) – bucket feeders in paddock (3-5 wks)
- **Concentrate:** *Ad libitum* 0-8 wks – remove by 10 wks
- **Pasture:** Available from 3 wks

Group 2 – new system

- As per Group 1 above with no concentrate provided

  - Growth performance
  - *Immune and metabolic development*
  - *Feeding behavior and welfare*
  - *Mammary development*

Post-weaning: Plantain/white clover *vs. ry*egrass/white clover

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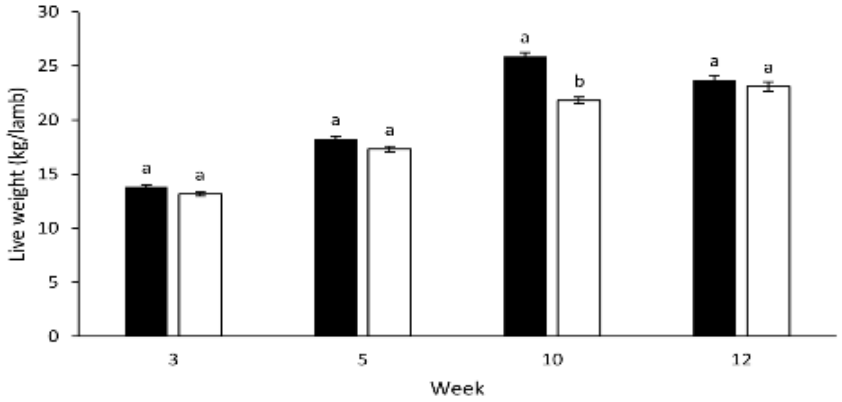
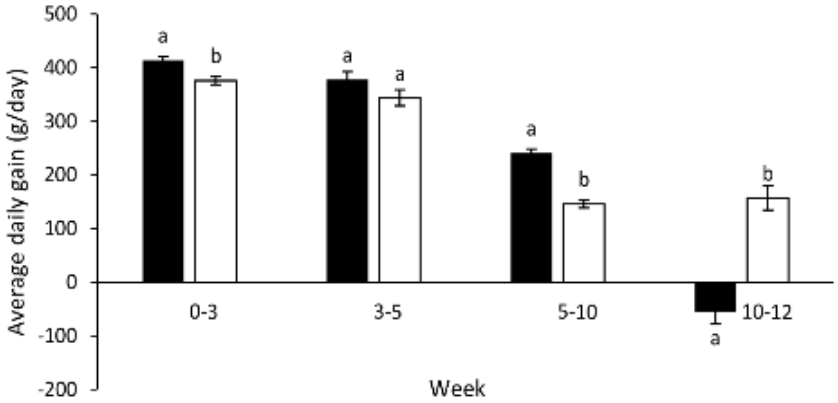
Results





- Similar live weight at 12 weeks
- Less transition stress in pasture group
- Establishment of rumination unaffected
- No effect on mammary size
- Less labour associated with pasture only
- Lower feed cost with pasture only
- Nil mortality
- Good quality pasture essential

	Meal Group	Pasture Group
Total milk intake (L)	71 L	66 L
Total milk DM intake (kg)	16kg	15kg
Total milk cost (@$3.5/kg)	$57	$53
Total meal cost ($1/kg)	$15	
Total feed cost	**$72**	**$53**

Jensen et al. (2017) NZSAP 77:13-17 ; Nieper et al. (2017) NZSAP 77: 18-22.

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Lamb growth post-weaning on Plantain/white clover *vs. ry*egrass/white clover

- No effect of diet on post-weaning growth rates (181 vs. 187 g/d P=0.73)
- Effect of pre-weaning diet

	Pre-weaning treatment			
	No meal	Meal	P	SED
Average daily gain (g/d)	202	166	0.05	15
Coccidiosis (%)	5	33	0.02	8
Spring eczema (%)	3	12	0.12	5

Stakeholder impact: Alternative feeding management system option (not yet in use)

Stevens et al. (2017) J. NZ Grasslands 79:49-54.

The value of our research

A suite of lamb rearing options developed for different farm systems

- 3 systems developed to date already in use on-farm
- Workshop held with partners to support tech-transfer – important!
- Industry partners have a greater awareness of how to monitor and evaluate on-farm animal performance to support their operations now and into the future
- Connection with international researchers to accelerate research outcomes for industry
- Strong relationships built between research and industry partners to support ongoing research activities and adoption and practice change on-farm
- Protocols and practices developed which will be formulated into best practice guidelines for industry

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Kingsmeade Artisan Cheese

Maui

Waituhi Kuratau Trust

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New Zealand Dairy Sheep Industry

- ~30,000 sheep – pasture-based system
- Currently 17 producers (5 in 2013) – rapidly expanding
- 3 of these have >5000 ewes
- 3 exporting companies (mostly Asian market)
- Products:
  - Export:
    - Milk powder
    - Infant formula
    - Milk tablets
  - Local:
    - Cheese
    - Gelato
    - Yoghurt
    - Liquid milk

BUSINESS

Is this dairy's new thing - milking sheep

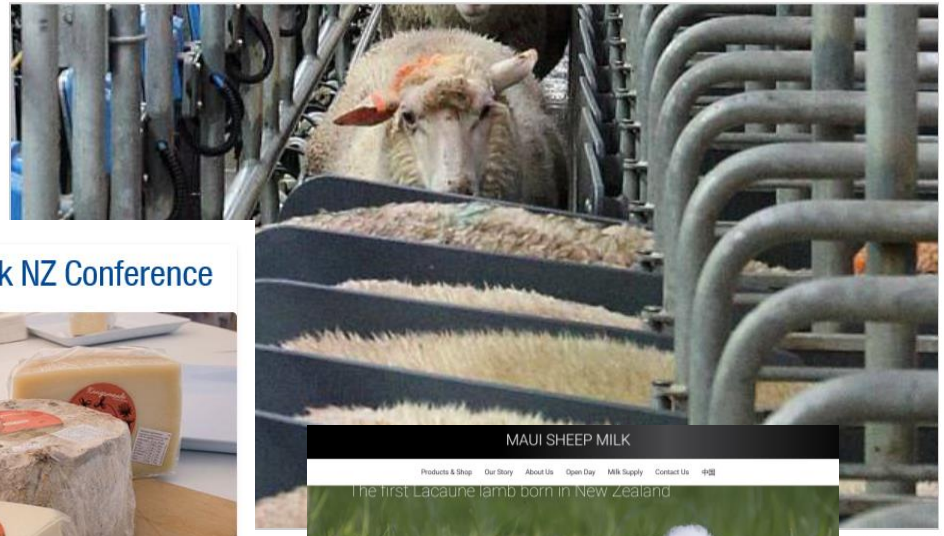
7 Apr, 2018 5:00am

6 minutes to re

Dairy sheep milking is coming of age in New Zealand

CRAIG PRICHARD

Last updated 12:08, February 9 2018



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DAIRY NEWS

NATIONAL WORLD OPINION AGRIBUSINESS MANAGEMENT FARM HEALTH MACHINERY & PRODUCTS

Wednesday, 14 February 2018 08:55

Sheep milking set to take off

Written by Sudesh Kissun

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A new breed of milking sheep and a demonstration farm with a 64-bail internal rotary have set the ball rolling for the dairy sheep industry.

Peter Gatley (left) and Jake Chardon.

The Wakino Station, on the western shores of Lake Taupo, is the home Maui Milk, a joint venture between the Waituhi Kuratau Trust and Shanghai food company Be Well.

The JV has milked 3000 ewes on a neighboring farm run by the trust since 2015; lessons learned are being implemented in the green-field development at

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Tahuri Whenua

Mihi / Welcome

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Dairy Sheep

10:18 PM
16/08/2018

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