EFFLUENT MANAGEMENT ON A DAIRY SHEEP FARM

RESEARCH AIM 1.4: ENVIRONMENTAL FOOTPRINT

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OUTLINE

- Overview of Research Aim – Environmental Footprint
- Effluent characteristics
  - Effluent volumes
  - Effluent concentrations
  - Comparison with other dairying systems
- Effluent delivery systems
- Rules and Regulations

OVERVIEW OF ENVIRONMENTAL FOOTPRINT RESEARCH AIM

Objective 1: Understanding the dairy sheep farm system
- » Literature Review
- » Case study farm nutrient flows

Objective 2: Characterising dairy sheep effluent
- » Characterise nutrient and bacteria contents
- » Understand volumes and flows
- » Develop best management practices

Objective 3: Understand the modelling framework
- » Information required to incorporate dairy sheep into OVERSEER® nutrient budget model

Objective 4: Design a low N footprint dairy sheep farm system
- » $ profit per unit N leached

Objective 5: Dairy sheep farming as a low N emitter to water
- » Field validation research trials

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OBJECTIVE 2:
CHARACTERISING DAIRY SHEEP EFFLUENT

Aim:

- Characterising the nutrient contents on our case study farms
- Quantifying the volumes and flows of effluent

Outcome:

- Report on dairy sheep effluent based on case study farm data
- Factsheet on dairy sheep effluent good management practices

UNDERSTANDING DAIRY SHEEP EFFLUENT

Information collected:

1. Estimates of dairy shed wash down volumes

2. Effluent sampling for laboratory analysis of nutrient composition

3. Effluent measurements from delivery systems to calculate hydraulic and nutrient loadings to land

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EFFLUENT VOLUMES

Effluent comprises:

- Stock excreta at dairy shed
- Dairy shed and holding yard wash down
- Milk vat cleaning (not necessarily daily)
- Once vs twice a day milking

Rainfall:

- Holding yard

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EFFLUENT VOLUMES

- Effluent generated from dairy sheds
  = 5-10 L/ewe/day
  (50-70 L/cow/day)

- If sheep are housed in barns - effluent volumes increase considerably
  = 15-20 L/ewe/day

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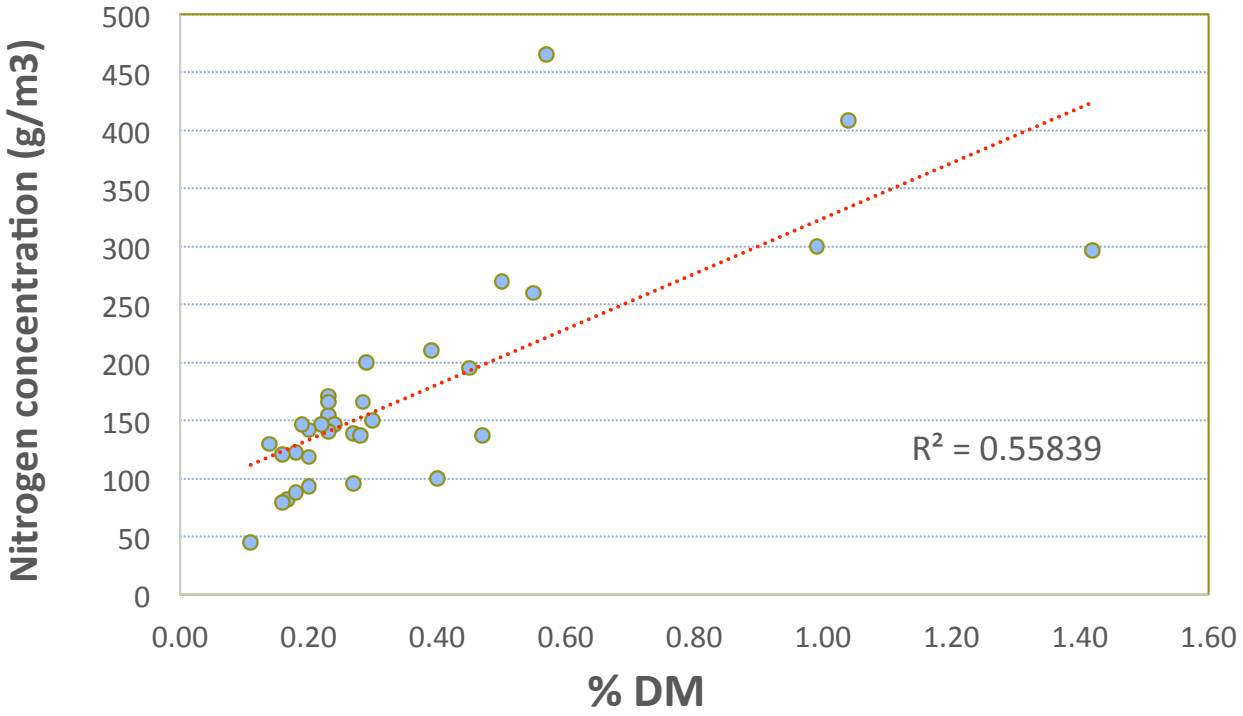
DAIRY SHEEP SUMP EFFLUENT COMPOSITION

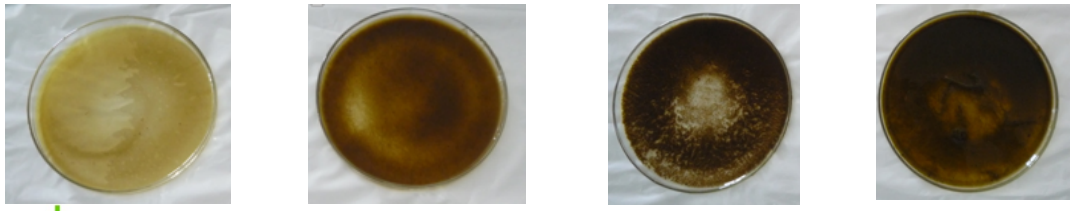
Nutrient	Mean	Median	Range
Solids (% DM)	0.36	0.24	0.11 – 1.42
Nitrogen (kg/m^3)	0.170	0.144	0.045 – 0.465
Phosphorus (kg/m^3)	0.031	0.030	0.010 – 0.056
Potassium (kg/m^3)	0.145	0.135	0.065 – 0.270
Sulphur (kg/m^3)	0.019	0.017	0.007 – 0.057

COMPARISON OF DAIRY EFFLUENTS

Nutrient	Sheep	Goat	Cow
Solids (% DM)	0.4	1.4	0.9
Nitrogen (kg/m^3)	0.17	0.21	0.45
Phosphorus (kg/m^3)	0.03	0.06	0.07
Potassium (kg/m^3)	0.15	0.15	0.37
Sulphur (kg/m^3)	0.02	0.14	0.06
Nutrient value ($\$/m^3$)	5.00	7.00	12.60

RELATIONSHIP BETWEEN NITROGEN AND SOLIDS CONTENT OF EFFLUENTS





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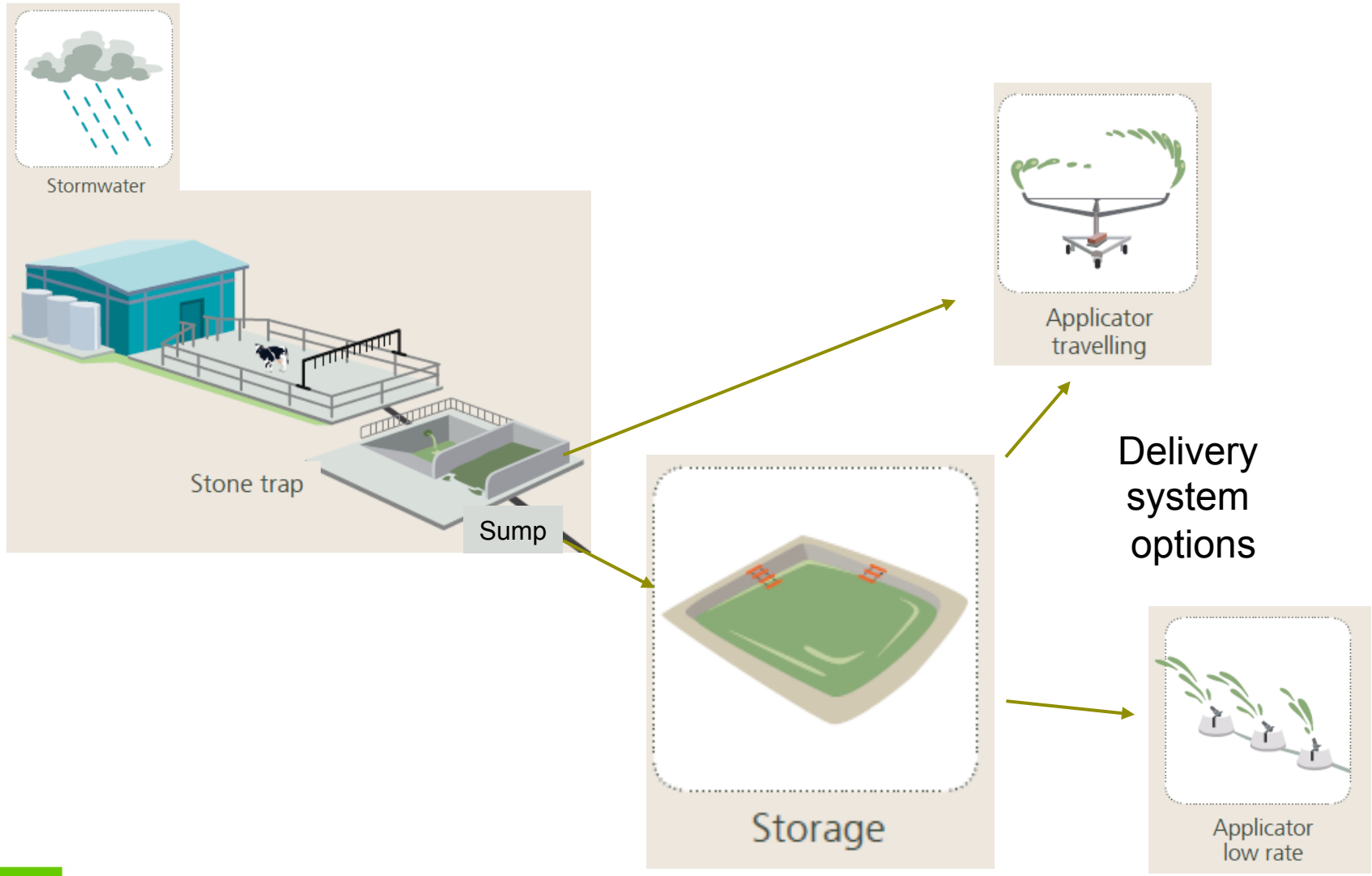
EFFLUENT MANAGEMENT SYSTEMS



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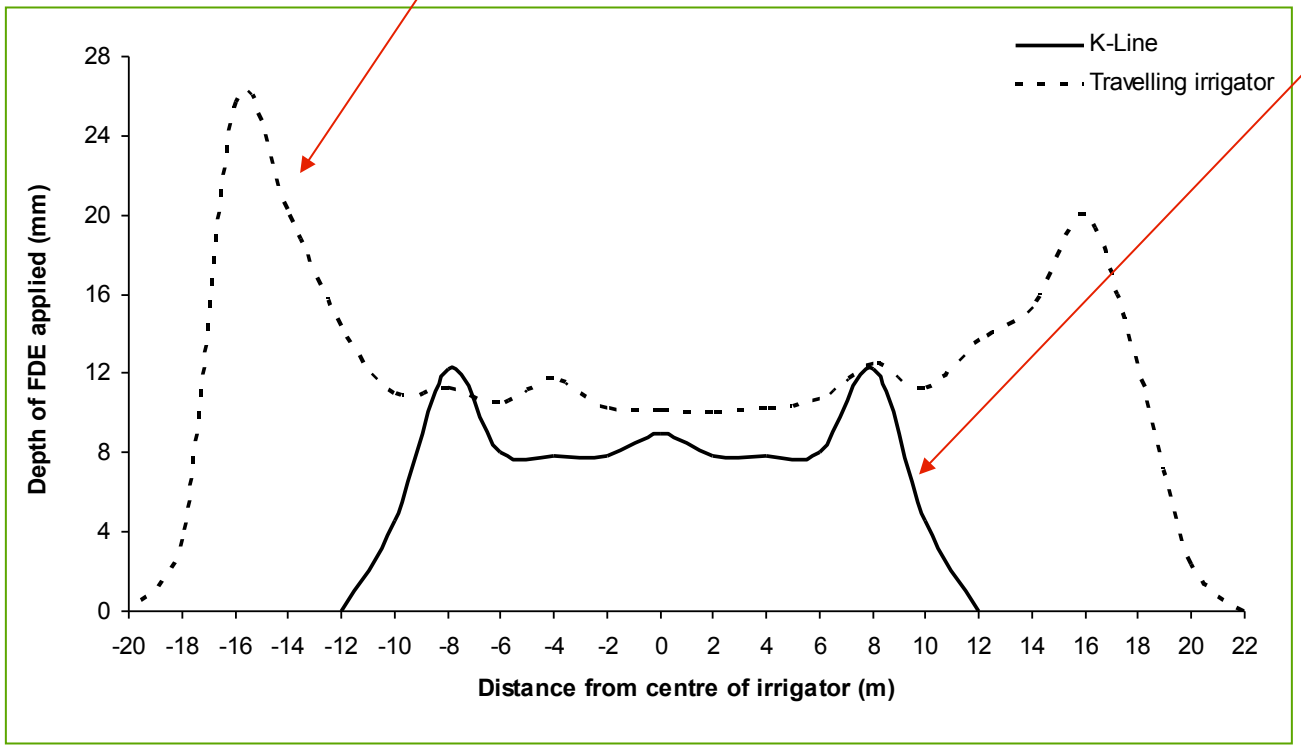
Images sourced from DairyNZ

EFFLUENT DELIVERY SYSTEMS

EFFLUENT SPREADING DISTRIBUTION

Average application depth



Monaghan et al, 2009

NUTRIENT LOADING – TRAVELLING IRRIGATORS
example from dairy cow industry

Speed Setting	Speed (m/hr)	Depth (mm)	N (kg/ha)	K (kg/ha)
Fast	60	12	36	42
Medium	36	18	63	69
Slow	24	24	124	86

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Longhurst et al, FLRC, 2014

RULES AND REGULATIONS

- 12 Regional Councils & 3 Unitary Regions (Tasman, Marlborough & Gisborne) control effluent land application
- Applications come under resource consent or covered by permitted activity rules
- However, district councils (67) may also have additional rules
- Nutrient loading (kg N/ha/yr): 150 - pasture; 200 – crop
- Hydraulic loading – application depth < 25 mm
- Not allow effluent to enter a waterway – i.e. good management practice around effluent placement & timing

TAKE HOME MESSAGES ON MANAGING DAIRY SHEEP EFFLUENT

- Understand local rules and regulations
- Understand your soil types
- Install appropriate effluent delivery systems
- Monitor spreading distribution to understand depth of application
- Sufficient storage
- Solids management
- Ensure system handles wool fibres

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ACKNOWLEDGEMENTS

MBIE
Waituhi Kuratau Trust
Kingsmeade Artisan Cheese
Spring Sheep Dairy
Maui Milk
Antara Ag

AgResearch colleagues:
Linda Samuelsson, Ross Monaghan and David Houlbrooke

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