Farming for economic & environmental sustainability

Can we have a WIN – WIN?

Alison Dewes

Headlands™
minimal footprint - optimal profit
An Intelact Initiative

Background

- Veterinarian
- 4th Generation Dairy Farmer NZ + Australia
- Nestle Australia – Quality Assurance + Milk Procurement
- Commonwealth Bank Australia – Agribusiness solutions/
- Manager Intelact Australia (water clawback Northern Victoria)
- MSc *submitted 2014* – Freshwater Ecology, Envt Policy & Nutrient Mgt
- Headlands Agribusiness Consultancy NZ (2011 - current)
- Expert Witness Envt Court & EPA: Selwyn, Ruataniwha, Canterbury, South Waikato, Horizons)

- Measures of Success in Farming?
- Broader Scorecards for the Future
- Tomorrows Farms Today – Dairy Farm Study 2011-2014
- Other Case Studies.

"Farming AHEAD OF THE GAME" using a BALANCED SCORECARD

Economic Drivers meet Ecological Constraints

1980's - present	Future Resilience will need
• More commodity per animal and per hectare • Equity gain through asset appreciation – capital gain, water, increased output, shares. • Growth facilitated by intensifying/reliance on marginal land.	• Economic strength in volatile times.(ROC + droughts,) • Lower Environmental Risk • Right Land Use for Land Class. • Skilled staff + wealth transfer (succession). • Ethical + Legitimate performance: (food safety, welfare, traceability, resource use efficiency)

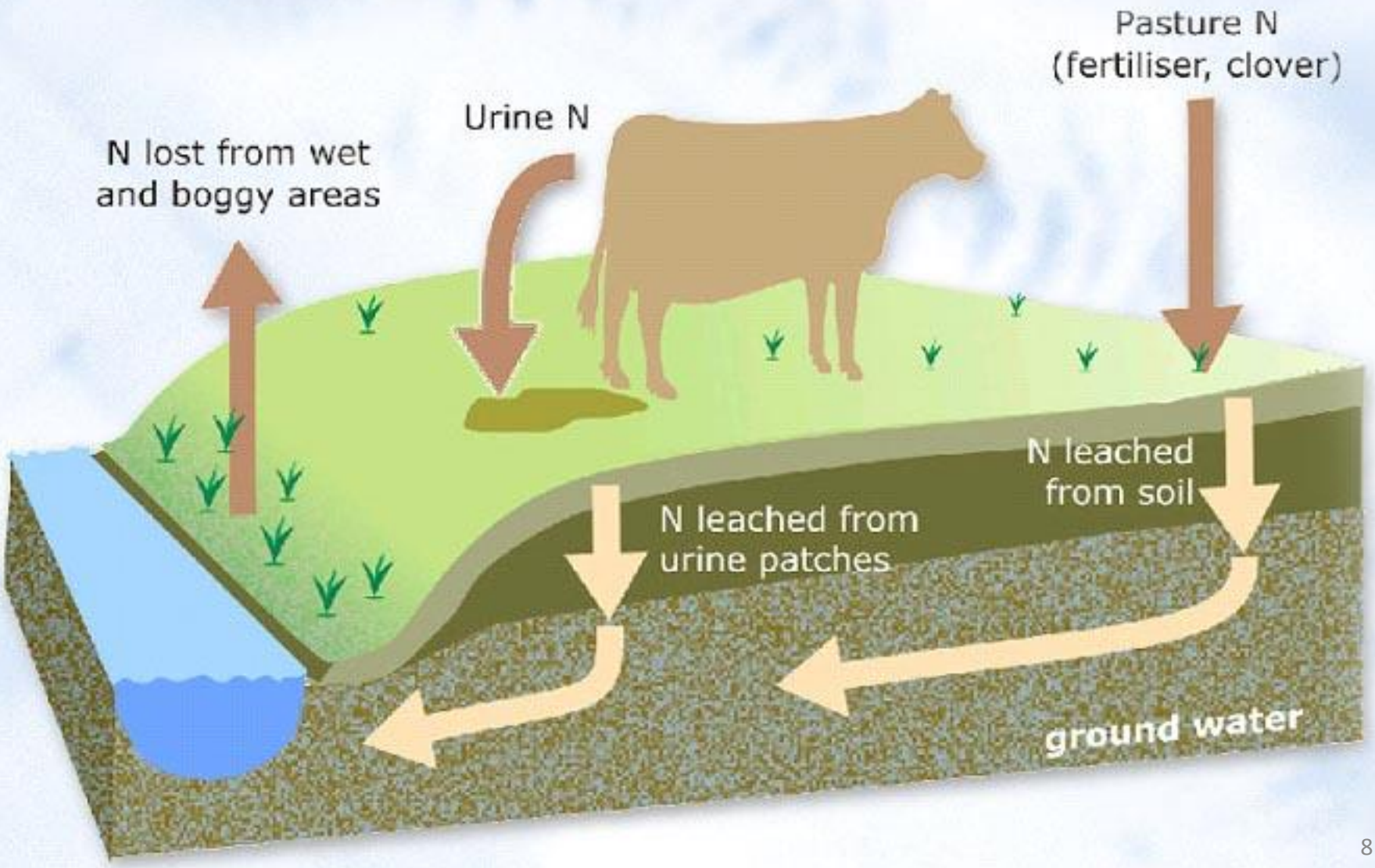
How does NZ measure success or **good performance on farm**?

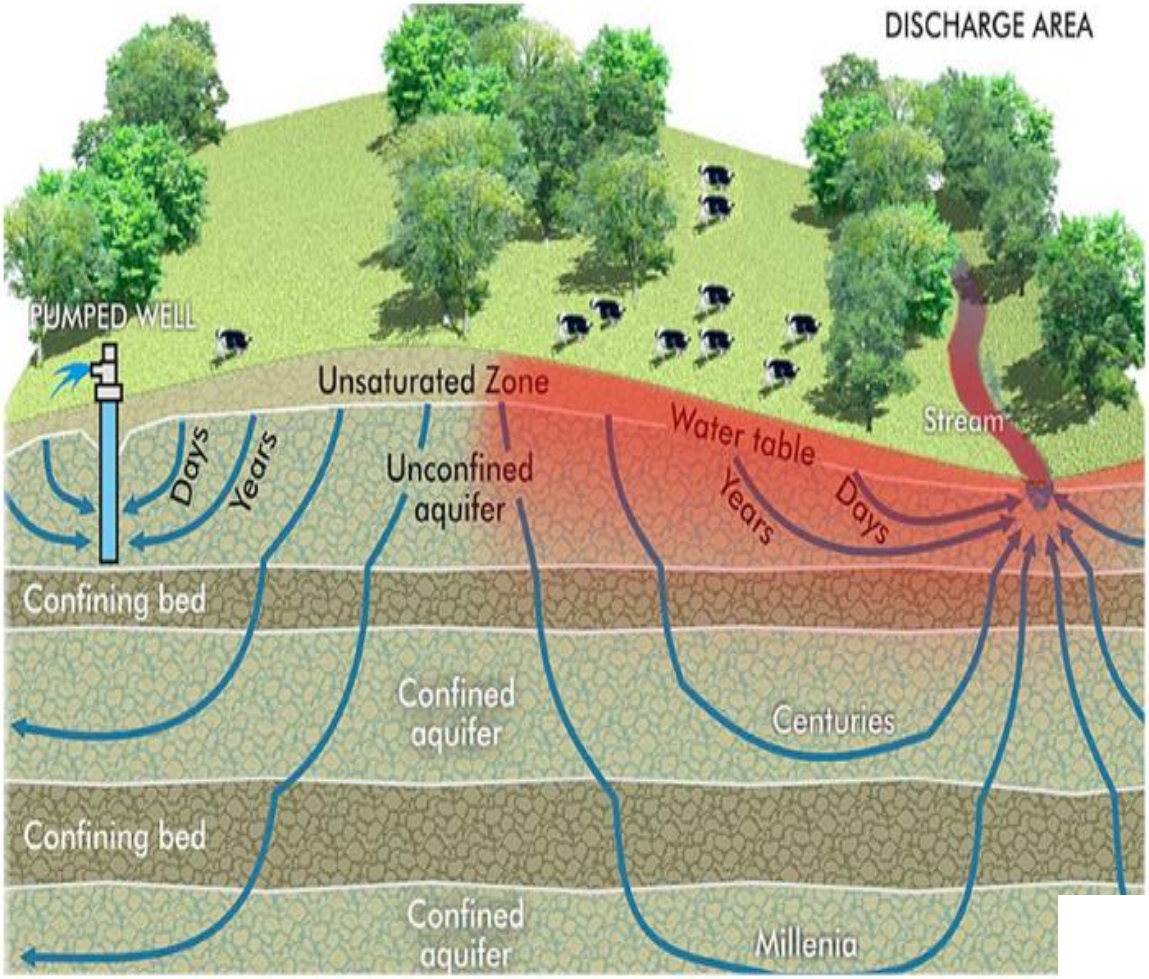
- **Production** e.g Milksolids, stock/commodity sold
- **Profitability** e.g: Return on Capital, Operating Profit, Cash surplus
- **Environmental** e.g: N leaching via Overseer
- **Productivity** e.g: cow efficiency, feed conversion efficiency
- **Risk/Resilience** e.g: equity %, or amount (%) of bought in feeds,

Environmental

Why worry about Nitrogen?

Nitrate - through the Land

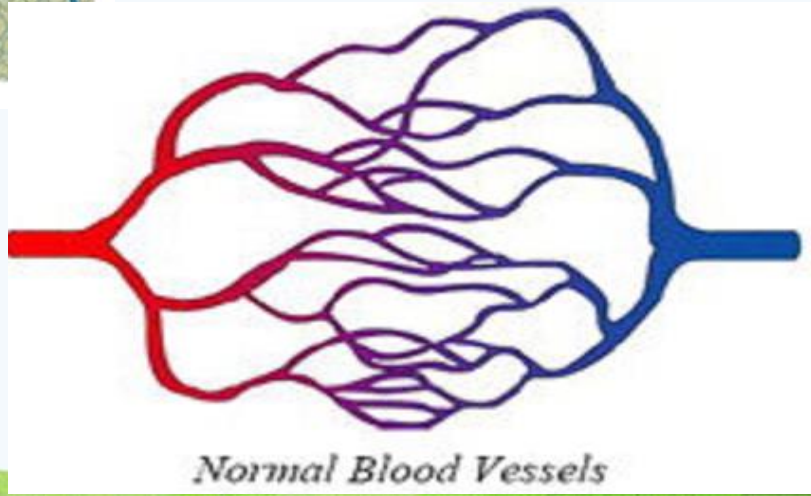




Groundwater is connected to surface waters

Effects can take years to decades

Nutrient rich rivers load up lakes and estuarine environments with nutrient which drives primary growth in water using up oxygen and life support capacity



EVERYTHING IS CONNECTED

Environmental measures for Farming

RELIABLE NAVIGATION EQUIPMENT(OVERSEER) IS ESSENTIAL

OVERSEER – a model used to assess environmental risk

- At farm level to estimate N loss for regulatory purposes.

  (i.e: the speed camera for the police)

- This is a **useful tool to guide the "RISK from a FARM but should be combined with other environmental RISKS. i.e: environmental scorecard system**

- Phosphorus, sediment and pathogen loss risk also need to be considered.

- Along with waterway protection, biodiversity support and waste management.

OVERSEER is GREAT FOR FARMERS

- It gives an **OUTPUT BASED MEASURE OF RISK**

  (using N loss)

- It **fosters innovation on farm** allowing them to manage a farm system towards a target.

- **IT MEANS FARMERS DON'T HAVE TO FACE INPUT CONTROLS** – ie- stocking rate, N use, prescriptive management regulations.

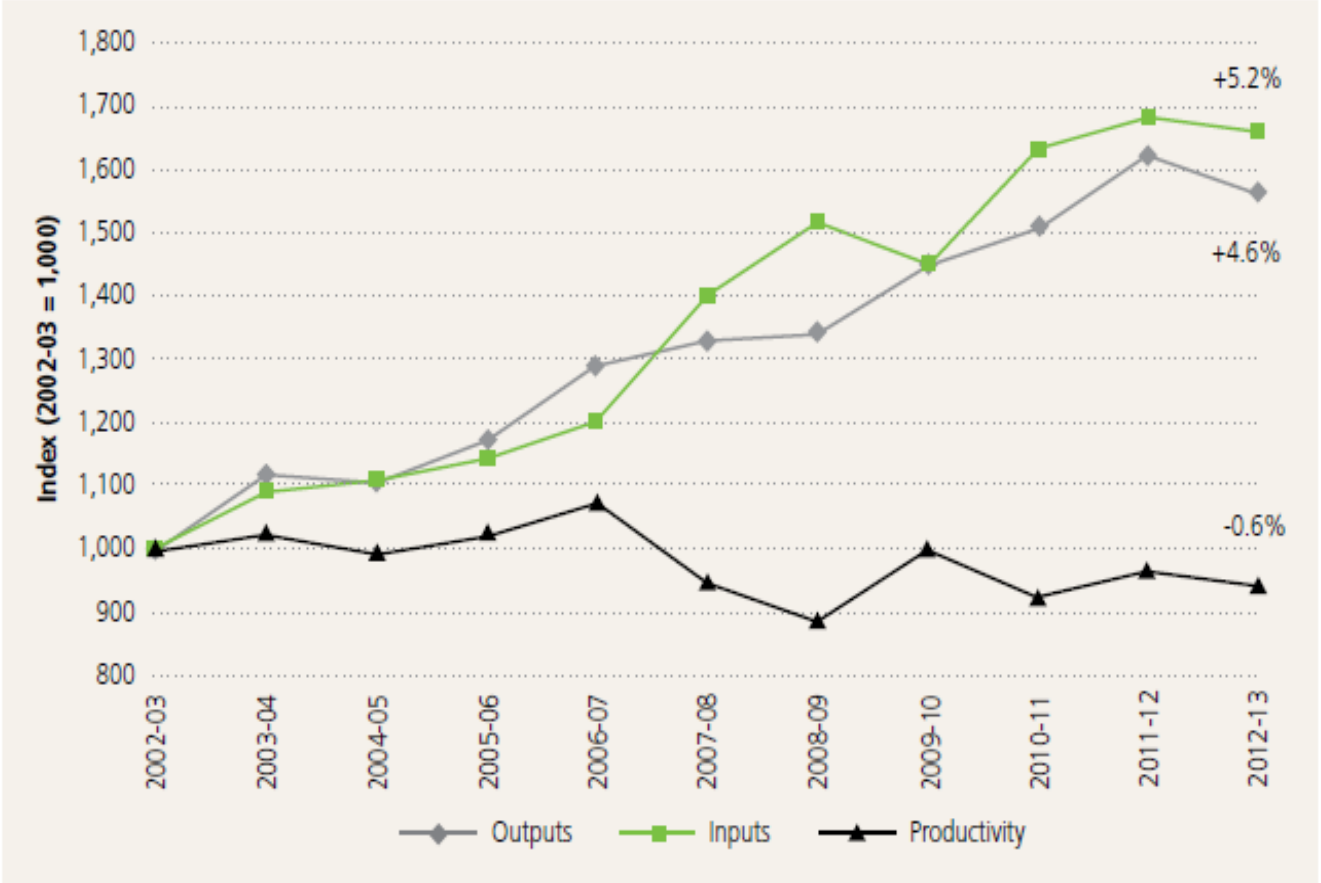
Economic + Farm Performance

Production vs Profit

IS MORE BETTER?

The Treadmill of Marginal Returns
More Production BUT less Productive

Figure 3.5: Dairy Farm Output, Input and Productivity Movements



Biological systems have natural limits:

These limits include: energy, capacity and resource availability.

Can we sustain continual growth of agriculture in New Zealand?

- E.g. ***Andy West***; *double current milk solids(MS) production and $3 Billion more lamb production.*

- ***E.g: THEO SPEIRINGS 30th of OCTOBER 2014 - " Believes NZ dairying can continue to expand over the next decade ,with 60 %of expansion based on conversions and more animals and 40% on more productivity .He said the country had NOT reached the point of having too many cows. He disagreed with the Environment Commissioner's comments that more dairying means a drop in water quality . NZ dairying could easily grow for the next 10 years by 2-3% per year "he said.***

- **However, this will require approximately 22 billion kilograms of extra dry matter fed + create extra effluent and nutrient challenges**

- **Will not provide additional revenue to cover the additional costs (MR<MC).**

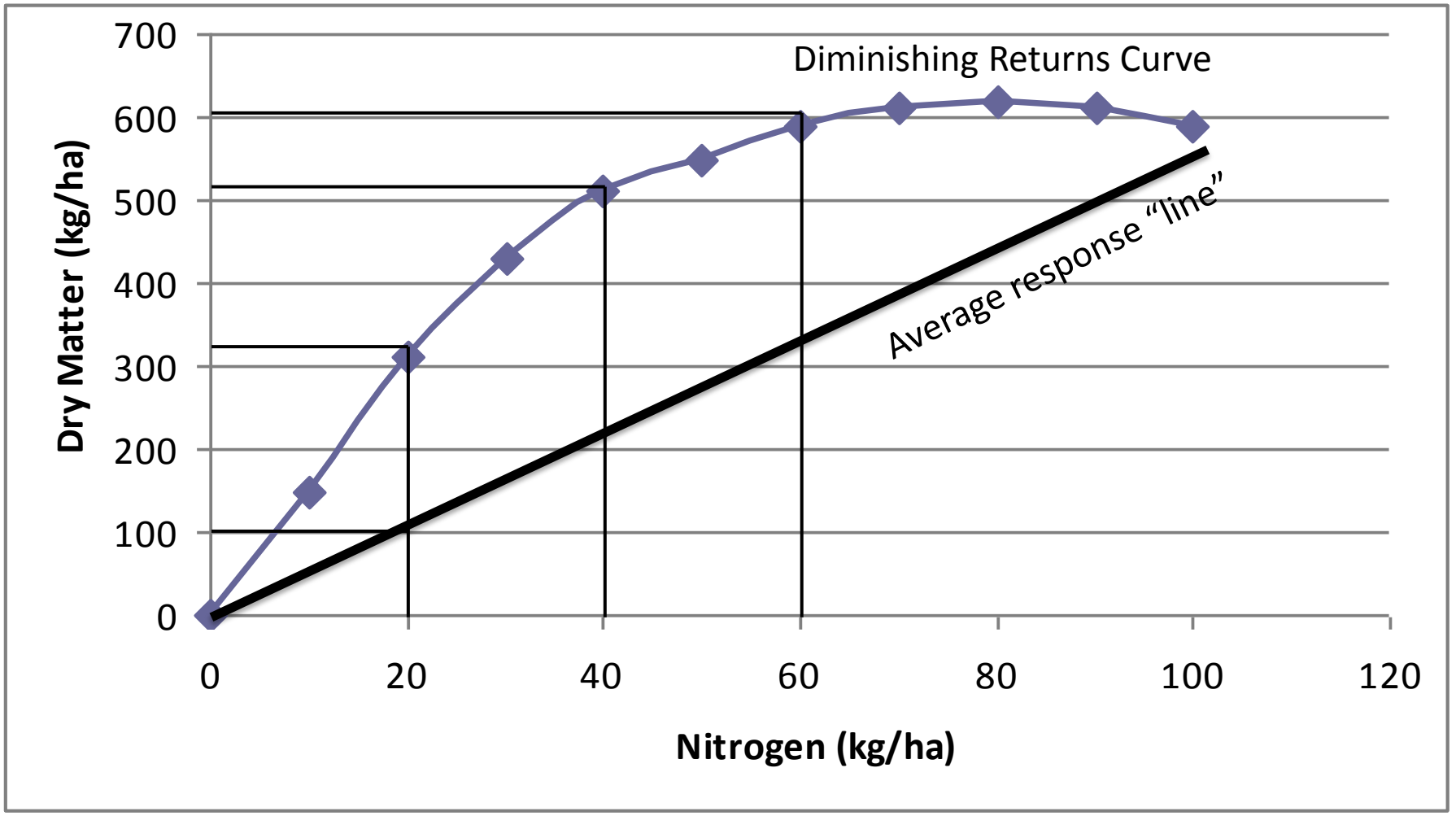
MORE IS NOT ALWAYS BETTER

MARGINAL GROWTH and PRODUCTION = ↑RISK

HIGH SOCIAL COST WITH LOW SOCIAL BENEFIT

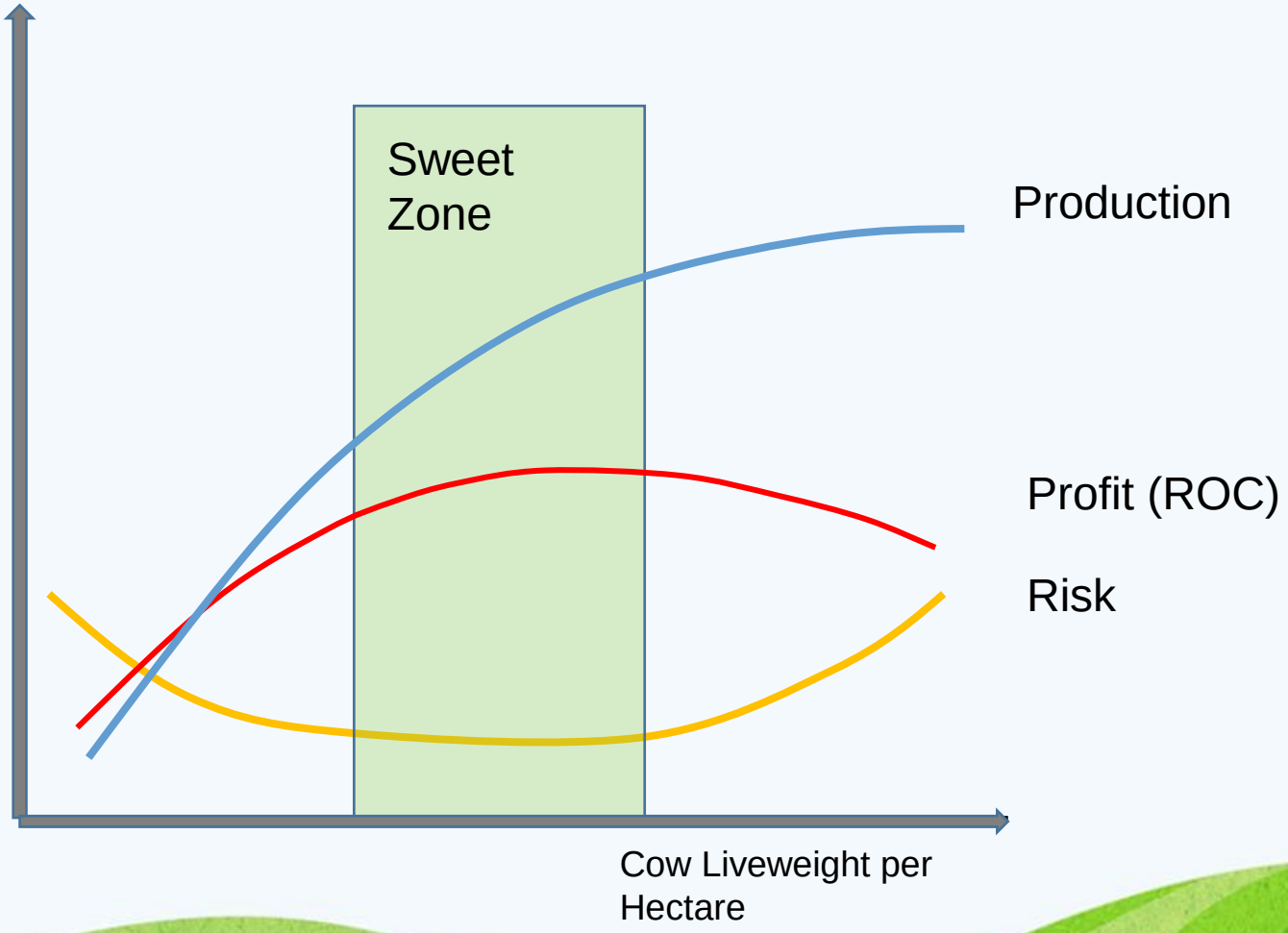
GSL DIAGNOSTIC
DRIVING PROFIT THROUGH INNOVATION

Economic Limits – Resource use.



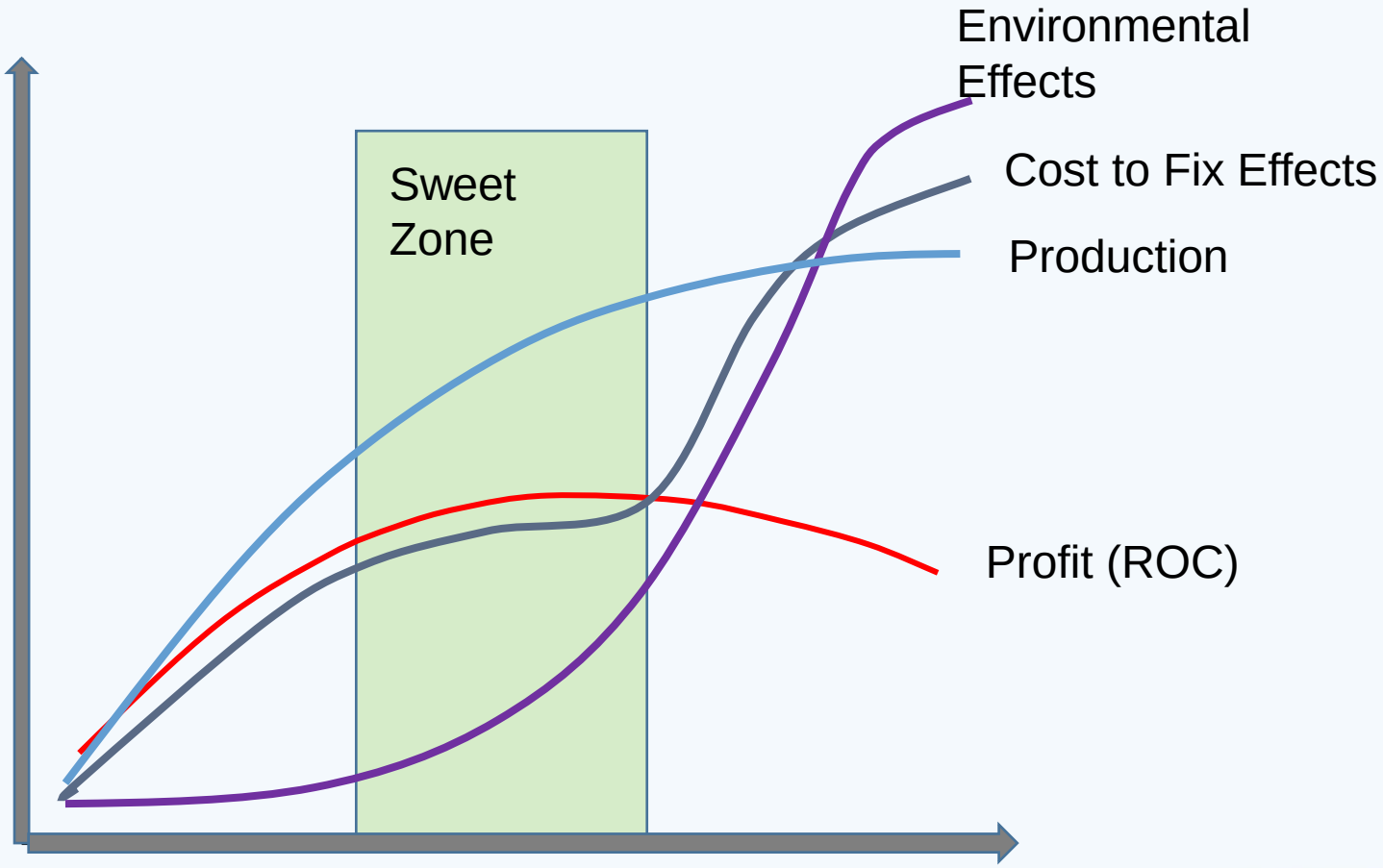
The Sweet Zone

Business Indicators



The Sweet Zone

Physical Indicators



True profit + true environmental costs?

Investment	Average return on capital (ROC%)	Top 10%	N loss
Term Deposit	4.5 (no work)		
Dairy ($6.10 payout)	4.6	7-8	30-90
Sheep, Beef, Deer	4-5	7-8	10-40
Manuka	4.3 (no work)	9 (beekeeping)	3-4

Economically Resilient + Low Impact Dairying Tomorrows Farms Today

2010-2014

120 k North at Cambridge

TOMORROWS FARMS TODAY
4th Season of Analysis: 100 farm datasets

- Upper Waikato – Declining WQ
- Reporoa + Broadlands - Pumice Soils
- 1000-1300 mm rainfall
- 25 farms with 3 part irrigated + 1 fully
- **What farms** had the **most stable return on capital (ROC) at different milk prices, and the lowest environmental impact.**

ENVIRONMENTAL SCORECARD 2014

Headlands
minimal footprint - optimal profit
An Intelact Initiative

	DEFINITION	1. HIGH RISK - NEEDS ATTENTION	2. MED-HIGH RISK	3. MEDIUM RISK	4. LOW - MEDIUM RISK	5. LOW RISK - EXCELLENT PERFORMANCE	YOUR FARM SCORE	YOUR FARM RESULTS
PRODUCTIVITY MEASURES	Operating Profit/KgN Leached/ha					■	5	190
	KgMS/KgN Leached/ha					■	5	105
EFFICIENCY MEASURES	GHG g/kg MS					■	5	8
	Nitrogen Conversion Efficiency %				■		4	43%
	Kg Soluble N Applied/ha				■		4	81
	kg N Leached/ha					■	5	14
	kg P Runoff/ha					■	5	0.7
EFFLUENT MANAGEMENT	Nitrogen applied as effluent		■				2	147
	Percentage of milking platform receiving effluent		■				2	15%
SOIL QUALITY & PROTECTION	Winter Cropping % of farm					■	5	0%
						OVERALL SCORE		

Naked Business Discussion Group – "Bare All"

What farms most profitable + resilient with best envt. performance?

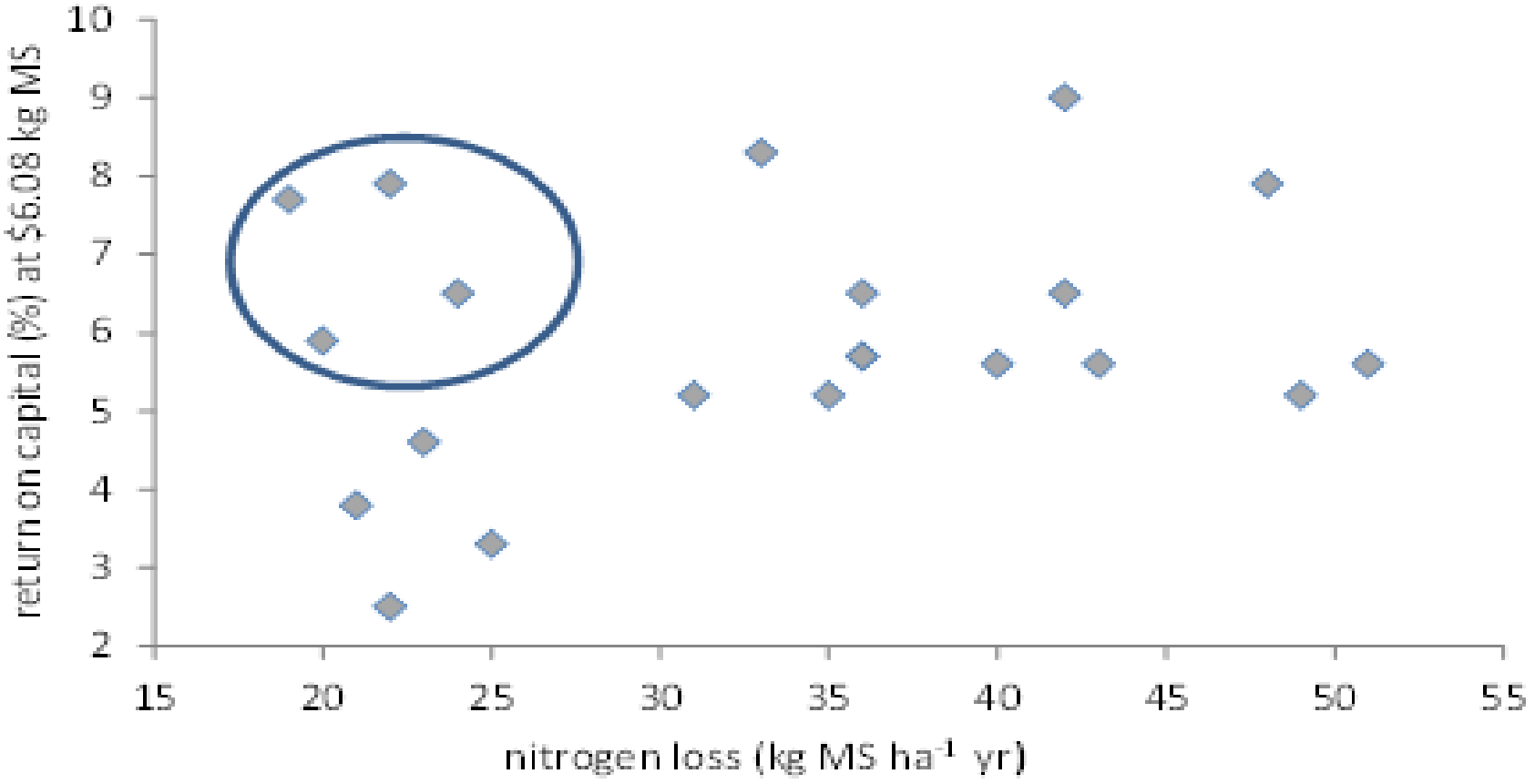
- 30% change in milk price
- Dry years
- Notional nitrogen limit

(40% less than average)

"Its not the good years that make you, but the tough years that break you" ***– Colin Guyton*** (Tomorrows farms today)

Tomorrows Farms Today
MAKE MILK + MONEY WITH A LOT LESS EFFECT

DOUBLE THE PROFIT WITH HALF THE ENVIRONMENTAL EFFECT

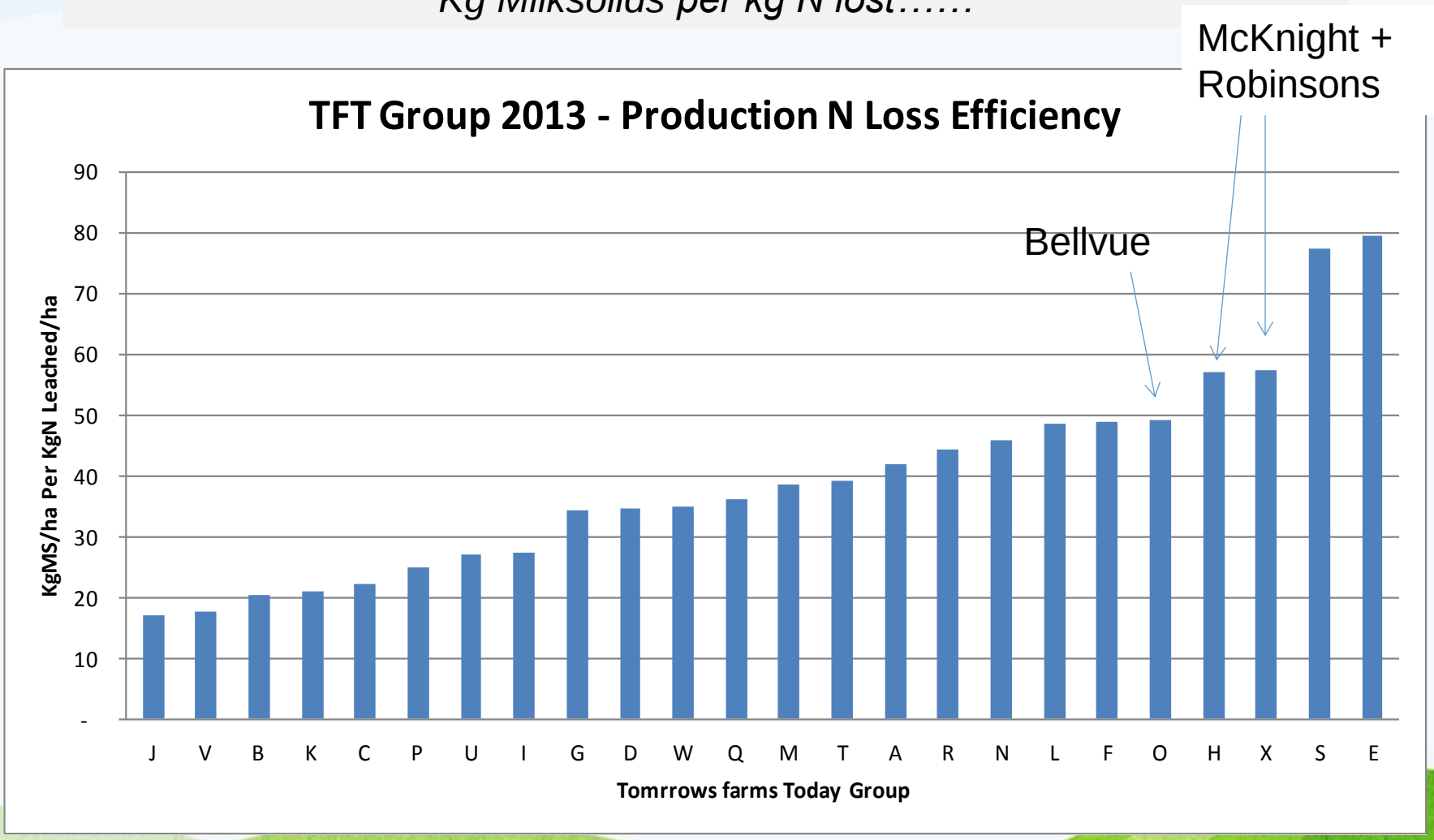


Mc Knight & Robinson: 8-9% ROC + 20 -22kg/N Leached (2012)

Central Plateau Average: 4.5% ROC + 39kg/N Leached

DOUBLE THE PRODUCTION
½ THE ENVT EFFECTS

Kg Milksolids per kg N lost……



Best performers ave 2010-2012	Farm A (R)	Farm B (P)	Farm D (G)	Farm C (Gi)	Average Central Plateau
Stocking Rate	2.7	2.4	2.6	2.6	2.9
Bodyweight/Ha	1270	1171	1248	1118	1392
ROC	8.5 %	7.7%	5.9%	6.8%	4.6%
Operating Profit/ha at $6.00	**3,312**	**3,087**	**2,753**	**3090**	1,855
Cost per kg of milksolids $	**3.71**	**3.69**	**3.58**	**3.22**	4.57
kg N Leached/Ha Overseer 6.0	22	18	20	25	36-39
Kg MS/kg N lost	**53**	**54**	**61**	**41**	27-33
Wintering off?	some	all	all	Nil.	some

Influences on Profitability

- **More** milk solids per hectare or per cow, stocking rate, N use, or pasture harvested **did not correlate** with higher return on capital in 2010-2012.

- Amongst the group – only 3.5% of the variation in profit could be explained by the variation in N leaching.

What Separated “Best From the Rest”

- An “approach” vs a farm system type.
- Do simple systems really well + on time (vs complex system not so well)
- Excellent information – monitor + measure.
- Right stocking rate (< 4.2 T home grown feed/cow) – efficient cows, well fed, high productivity.
- High % farm receiving effluent, modest N use, >85% grass systems, high quality cows, feed cows to potential/attention to detail

Confidence to Explore New Thinking

System aligns with core values

- ✓ **Lower Impact**
- ✓ **Simpler to Run**
- ✓ **Profitable**
- ✓ **Resilient with Buffers**
- ✓ **Less business risk**
- ✓ **Meeting the Rules**
- ✓ **Ahead of the Game**

Bellvue Farms - Adapting to Change

- 1100 Cows (2006-7)
- 870 cows (2010)
- 650 cows (2014)
- 580? Cows (2016)

40% lower SR,

More Control

Less cost to Mitigate Effects

No Fence Sitting

- ***2014-2024****….. will see polarisation of farm systems two ways (….no fence sitting)*

⇨ *lower (optimal SR and modest inputs **OR** to high input/intense with advanced mitigations* *eg Arnolds)*

SUMMARY

- We have to learn to operate **within biological limits with more efficient resource use.**
- Some farmers have already innovated solutions – we need to learn from the best.
- We **can learn from leaders** – but need good information, correct measures and a balanced scorecard approach.
- There will be "**Win – Win**" opportunities.

Early adopters are already operating great systems.
“There are a range of ways to get there”.

Plan together for resilience + farming within ecosystem health limits.

Other DAIRY Examples of double profit + half the environmental impact

- **Andy + Jenny Hayes –** simple low cost + "closed loop" system, minimal soluble fertiliser, enhancing biodiversity support, low level of infrastructure.(50 kg MS/kg N leach)
- **Bruce + Donna Arnold** – Highly Intensive, with advanced mitigations (feedpad, 50% bought in feed, precision, irrigating 60% of farm with effluent + whole farm soil test. (80 kg MS/kg N leach = ↑efficiency, ↑profit, ↓footprint)
- **Rex Butterworth + Mike Parnwell** – Advanced mitigations, half the leaching, twice the profit, but note high capital investment.(50 kg MS/kg N leach)
- **AVERAGE WAIKATO = 25-27 kg MS/kg N leach.**

"LAKE VIEW FARM Hamilton"
A TALE OF TWO HERDS

- **2009 –Base Farm 530 cows**
- **2011** - Drop to 430 cows and ROC improves and (economic)risk drops
- N loss ↓ 30% and ↑ profit.
- **2014** - **Drop to 350 cows,** ↓Risk, ↓N leach, ↑Profit.

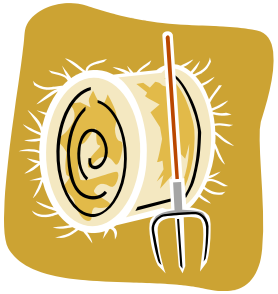
40% drop in SR improves business on this farm, ↑ economic resilience ↓footprint by 50%.

SMART NEW FARMS

- Bruce and Donna Arnold - who run a complex and intensive system on alluvial silt and gley soils in the Waikato won the Dairy Business of the Year Awards last year, with a 9.0% ROC while having an effluent system delivering nutrient to over 60% of the farm, reduced soluble fertilisers continually and, and leaching 19 kg N loss/ha/year which is around half of the Waikato Average (35 kg N leached).

BASE FARM

750 cows



Buy & feed 648,500kg DM
(865kgDM/cow)

262,935kg MS
(350kg/cow)

$ **740,235**

N

N leach 18
kg/ha/year

MARGINAL ANALYSIS

618 cows

Buy & feed
23,000kgDM
(37kg/cow)

$ **784,840**

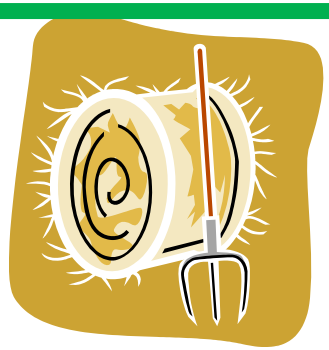
216,775
kg MS

N

15kg/ha/
year

+

132 cows



Buy & feed
625,500kgDM
(4740kg/cow)

$ **-44,607**

47,160
kg MS

N

3kg/ha/
year

(750 cows; 262,935 kgMS; $740,235; N leach 18)

From LP optimisation & production per cow at 380 MS/cow

557 cows

Buy & feed ???

$877,365

18.5% increase vs base farm

213,970 kg MS
(380kg/cow)

N

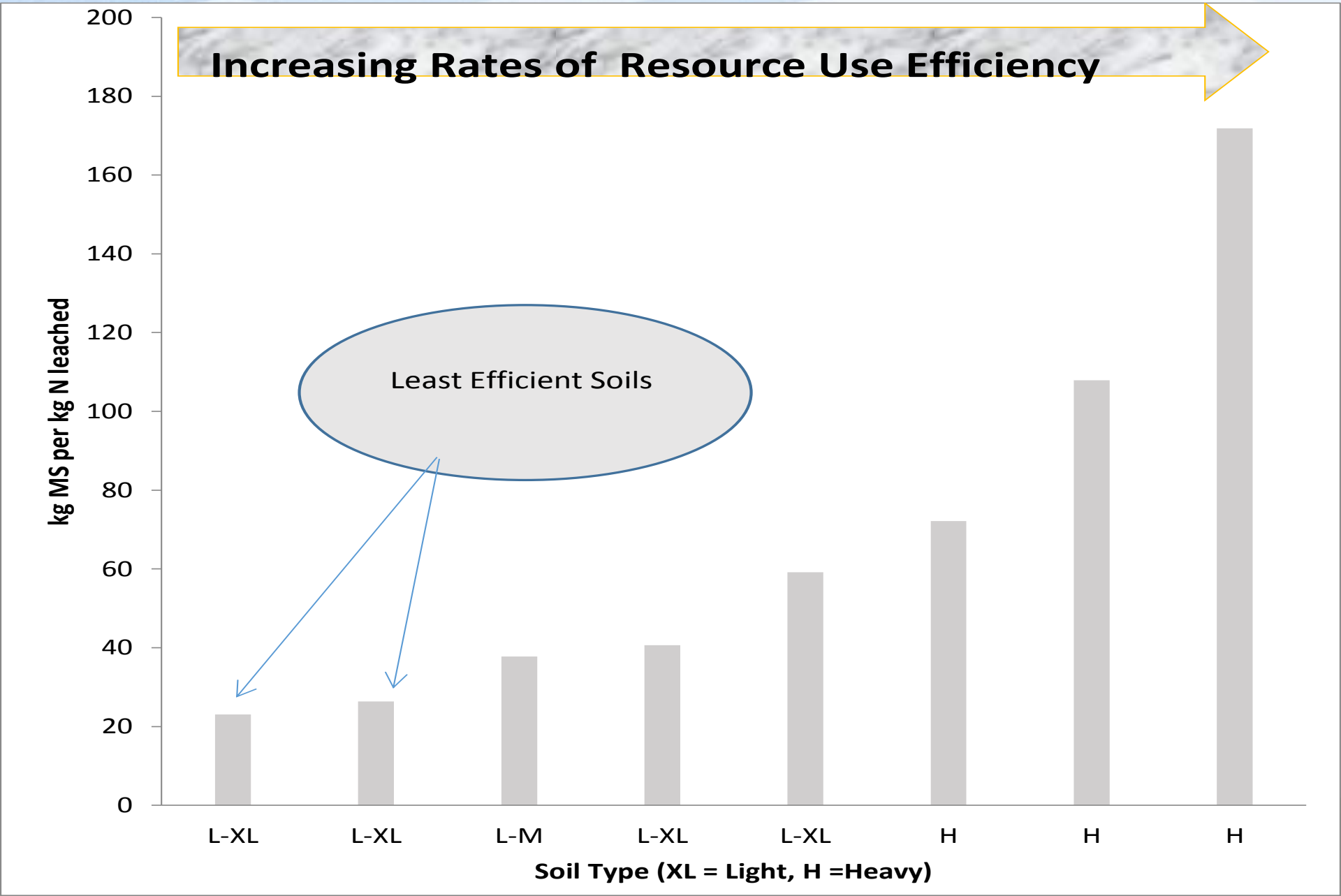
N leach 13 kg/ha/year

28% reduction vs base farm


WHERE DID WE GO WRONG?


WE ASSUMED ALL SOILS WERE EQUAL

INTENSIFYING THE Upper Selwyn Catchment where L & XL soils have high rates of nutrient loss relative to productivity (M-H soils most resource efficient)



Irrigation Example: Broadlands Farm

- **62% N loss Reduction**
- **50% P loss Reduction**

Pastoral block reports

Nutrient budget | Nitrogen | Phosphorus | Graph - N pools | Graph - changes in N poo | Other values

Nutrient budget

Leaching (Actual data)

(kg/ha/yr)	N	P	K	S	Ca	Mg
Nutrients added						
Fertiliser, lime & other	178	7	50	48	16	3
Rain/clover N fixation	108	0	1	2	1	1
Irrigation	13	1	8	13	47	11
Supplements fed on block	68	14	39	11	4	7
Nutrients removed						
As animal products	116	20	27	7	28	2
As supplements	0	0	0	0	0	0
Net transfer by animals	49	5	35	4	6	3
To atmosphere	70	0	0	0	0	0
To water	72	1.0	12	56	57	4
Change in block pools						
Organic pool	59	25	0	6	0	0
Inorganic mineral	0	21	-7	0	-2	0
Inorganic soil pool	0	-52	33	0	-22	13

* Acidity - used in calculation of maintenance lime requirements. A gain in acidity indicates that soil pH will decrea

Download this report

Nutrient budget | Nitrogen | Phosphorus | Graph - N pools | Graph - changes in N p | Other values

Nutrient budget

Leaching (Overseer Protocol)

(kg/ha/yr)	N	P	K	S	Ca	Mg
Nutrients added						
Fertiliser, lime & other	178	7	50	48	16	3
Rain/clover N fixation	109	0	1	2	1	1
Irrigation	5	0	3	5	17	4
Supplements fed on block	68	14	39	11	4	7
Nutrients removed						
As animal products	116	20	27	7	28	2
As supplements	0	0	0	0	0	0
Net transfer by animals	49	5	34	4	6	3
To atmosphere	70	0	0	0	0	0
To water	25	0.5	12	48	19	1
Change in block pools						
Organic pool	99	25	0	6	0	0
Inorganic mineral	0	21	-8	0	-2	0
Inorganic soil pool	0	-52	29	0	-14	10

* Acidity - used in calculation of maintenance lime requirements. A gain in acidity indicates that soil pH will decr