Economically Reducing Inputs to 190kg N from fertiliser

- tools and trade off's to consider -

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Summary

Not the beginning of an apocalypse

- Reducing to 220kgN for most is relatively easy.
- A large amount of Canterbury is close.
- For many this will induce a solid review of all farm inputs/costs.

Not all "Beer and Skittles" either

- 12 months to make the change (unless policy is relaxed).
- Our systems are Psychological as well as Biological, which makes it difficult to change overnight.
- Some are using over 300kgN.
- During "development" phases using 190kgN is yield limiting.
- Have to make some changes at a system level.

How Easy?

300kgN → 270kgN (Minor Tweaks)

270kgN → 220kgN (System and Management Changes)

220kgN → 190kgN (Transformational Change Required)

Tool 1

Eat the grass that we grow

There is about a 10:1 response kgDM:kgN

- Using 400kgN should grow 16.5t
- Using 200kgN should grown 14.5t
- Using 0kgN should grown 12.5t

Why grow 16t when you only eat 12.5t?

- The average punter consumes 12-12.5t/year
- Leaching increases from 40kgN to 120kgN when go from 200-360kgN
- Topping is 200-500kgDM
- Missed opportunity for growth on 18 day round (uptake 20-24 days)
- If 60 days on 18 day round = 0.8 grazings at 30kgN = 24kgN saved

Tool 1

Grow the grass we can eat

N is the cheapest form of feed but its not cheap!

- Urea @ 10:1 = 13c/kgDM
- But if you aren't eating it?

Budget the feed

- Maintain as close as possible a 2100-2300 cover
- If you need the feed, use the N
- If you produce too much feed and have to top…
- Broad acre application of high rates?
- Suggested savings up to 600kgDM/ha supplements (or 60kgN less)

Tool 2

Enhance Clover

Its free N!

- 25-50kgN/tDM
- 0kgN = 16% clover
- 200kgN = 12-15% Clover
- 300kgN = 3% Clover
- 400kg N = 3% clover

- More N is a death spiral –over 300kg, the clover population drops, then you need more N, eventually ending up at 400kg.

Tool 2

Enhance Clover

Cost?

grass %	clover%	MJME/ha	Feed Cost	kgN Fixed	N Value	nett value
95%	5%	169,578	$0 ha	36	$48 ha	$48 ha
90%	10%	168,106	$57 ha	73	$96 ha	$39 ha
85%	15%	166,588	$117 ha	109	$145 ha	$28 ha
80%	20%	165,025	$178 ha	145	$193 ha	$15 ha

How?

- Appropriate grass planting rates (D:12kg, T:16kg)
- Modest N rates (smother)
- Manage covers pre and post
- Soil conditions

Tool 3

Ecotain/Agritonic

Reduces N leaching

- Maintain 30% in pasture.
- Can reduce leaching by up to 20%.
- If its not lost it can be used.
- 60kg leached without Ecotain.
- 20% saved is 18kgN.

How?

- Plant 3kg.
- Top up every year with 1kg in with super.
- Nett gain over cost of seed $15/ha.

Tool 4

Coated Urea

Urease Inhibitors

- Slow the conversion from Urea to Ammonia gas that can be volatalised.
- Urea un-watered for 48 hours = 25% loss
- Urea un-watered for 8 hours = 12% loss
- Spring use
- Summer perhaps depending on watering
- Say 200kg N used, if can save even 9% from loss = 18kgN
- Cost = 10% more than Urea (nett zero)

Ammonium Versus Urea

- Urea to Ammonium = 3-10 days (season dependant, conflicting research)
- Can help with feed budgeting

Tool 5

Grass Type

Tetraploids vs Diploids

- In theory Tetraploids last 7 years (12?)
- In theory Diploids last 10 years (15?)

	Tetraploid	Diploid
Average Age	5	7
Annual Yield	14,569	12,391
Normalised Yield	13,694	11,824
N Use	194	221
NUE	76	56

- 1.8tDM/ha gain like for like management
- 27kg N use less
- Caution regrassing 1 in 8 rather 1 in 11 years
- Caution low (under 13%)DM in spring with Tetraploid

Tool 6 (extra help)

Growth Promotants

Gibberellic Acid

- Needs nitrogen with it, and after grazing (nothing is free)
- Can generate a flatter feed curve
- N use efficiency not any greater so need be mindful of early use and impacts later in the season.
- Growth 30kg, soil temp 7-10^{o}C (rising) or 10-16^{o}C (falling)
- Apply 5 days after grazing
- Don’t graze for 3-4 weeks
- 36% gain in growth rates (300kg)

Tool Summary

Tool 1

Grow what you can eat

(30kgN not used to grow unused feed)

Eat what you grow

(60kgN feed better utilised)

Tool 2

Allow +5% Clover

(36kgN more made available)

Tool 3

Agritonic Plantain

(18kgN more efficiently used)

Tool 4

Urease inhibitors

(18kgN retained in profile)

Tool 5

Tetraploids

(27kgN less input for 1.8tDM more)

Total Savings 189kgN?

Systems Approach

Fertiliser/Promotants

- A month by month N plan/budget (rates by month)
- Detail of product type by season
- A monthly reconciliation and reporting system (to yourself)
- Use Ammo type products if you feel you must still apply 65kg of product

Feed budget

- Maintain 22 day round minimum, let the N do its job
- Weekly pasture covers
- Record history to predict the future (Year on Year)
- Back out the concentrates and avoid substitution

Less Efficient Farm

Impact of Nitrogen Use on Farm System			
	Current Nitrogen use	270	*kgN/Ha*
	Legislated Nitrogen use	190	*kgN/Ha*
	Drop Required	80	*kgN/Ha*
where	Response Rate (KgDM grown/kgN applied)	10:1	
Equals	Feed From Extra Nitrogen	800	*kgDM/Ha*
Where	Opportunities to take out feed		
plus	Silage made on farm (kgDM/Area)	0	*kgDM/Ha*
plus	Topping carried out (150% farm x 200kgDM)	300	*kgDM/Ha*
plus	Feed wasted / decay in pasture with excess cover (2200-2300 = 0kgDM additional decay) (2400 for 2 months = 50kgDM addiitonal decay)	50	*kgDM/Ha*
Equals	Total Feed Saved Removed	350	*kgDM/Ha*
Where	Feed Deficit from Less Nitrogen	450	*kgDM/Ha*
Divide by	Stocking Rate	3.6	*cows/Ha*
Equals	Deficit per cow	125	*kgDM/cow*
Where	Options:		
	Less milk production assuming 8.5 : 1 response	15	*kgMS/cow*
	More Supplements	125	*kgDM/cow*
	Lower Stocking Rate (same milk per cow)	0.11	*cows/ha*
	Lower Stocking Rate (same total milk)	0.13	*cows/ha*

Impact of Nitrogen Use on Profit			
@ $1.33/kgN	=	$106.40	/ha
@ $45/ha	=	$67.50	/ha
@ $6.00/kgMS	=	-317.65	/ha
@ $0.48/kgDM Fed	=	-$216.00	/ha
3.57%	increase in milk per cow		

More Efficient Farm

Impact of Nitrogen Use on Farm System				
		Current Nitrogen use	220	*kgN/Ha*
		Legislated Nitrogen use	190	*kgN/Ha*
		Drop Required	30	*kgN/Ha*
where		Response Rate (KgDM grown/kgN applied)	12:1	
Equals	Feed From Extra Nitrogen		360	*kgDM/Ha*
Where	Opportunities to take out feed			
plus		Silage made on farm (kgDM/Area)	0	*kgDM/Ha*
plus		Topping carried out (150% farm x 200kgDM)	0	*kgDM/Ha*
plus		Feed wasted / decay in pasture with excess cover (2200-2300 = 0kgDM additional decay)	0	*kgDM/Ha*
Equals	Total Feed Saved Removed		0	*kgDM/Ha*
Where	Feed Deficit from Less Nitrogen		360	*kgDM/Ha*
Divide by		Stocking Rate	3.6	*cows/Ha*
Equals		Deficit per cow	100	*kgDM/cow*
Where		Options:		
		Less milk production assuming 8.5 : 1 response	12	*kgMS/cow*
		More Supplements	100	*kgDM/cow*
		Lower Stocking Rate (same milk per cow)	0.09	*cows/ha*
		Lower Stocking Rate (same total milk)	0.10	*cows/ha*

Impact of Nitrogen Use on Profit			
@ $1.33/kgN	=	$39.90	/ha
@ $45/ha	=	$67.50	/ha
@ $6.00/kgMS	=	-254.12	/ha
@ $0.48/kgDM Fed	=	-$172.80	/ha
2.86%		increase in milk per cow	