L W E Environmental I m p a c t

Overcoming Challenges in Modelling Nutrient Losses from a Non-Traditional Indoor Dairy Production Unit

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Lowe Environmental Impact

Outline

Scenario overview

Initial modelling approach

Revised modelling approach

Revised results discussion

The "So-What"





Do results make sense?





Round one outputs

			Post- conversion					
		Pre- conversion	A to B - CC Pasture	C to D - CC Lucerne	A to B Maize	B – Grazed pasture	Total	
N fertiliser	kg/ha	60					0	
N fixation	kg/ha	150					227	
N effluent	kg/ha							
<u>N leaching</u>	<u>kg/ha</u>	<u>13</u>					<u>12</u>	
Organic pool	kg/ha	98					128	
N concentration	ppm							
Drymatter production	Kg DM/ha							
Farmer anticipated drymatter production	Kg DM/ha							

Round one outputs

			Post- conversion					
		Pre- conversion	A to B - CC Pasture	C to D - CC Lucerne	A to B Maize	B – Grazed pasture	Total	
N fertiliser	kg/ha	60	0	0	0	0	0	
N fixation	kg/ha	150	520	344	2	264	227	
N effluent	kg/ha		310	407	123	310		
<u>N leaching</u>	<u>kg/ha</u>	<u>13</u>	18	<u>6</u>	<u>5</u>	<u>41</u>	<u>12</u>	
Organic pool	kg/ha	98	184	216	-39	313	128	
N concentration	ppm		13.1	20.9	2.5	32.3		
Drymatter production	Kg DM/ha		25,913	14,147	9,500	25,834		
Farmer anticipated drymatter production	Kg DM/ha		10,000	12,000	15,000	10,000		

Issues with initial approach

Limit on area able to be specified as fodder crop

Excreta distribution in modelling setup limited

Excessive urine leaching

Predicted pasture growth unrealistically high

Model saying that too much supplementary feed brought in

Production higher than typical NZ dairy operation

Typical conversion is 12 kg DM to 1 kg MSThis case 8 kg DM to 1 kg MS

Revised approach

Model as a cropping farm

• receiving external organic fertiliser.

Separate barn

• operation separate to land area used to generate feed.

Consistency	
 with other housed animal 	Removed dairy farm – cows only on farm
	during calving
Key revisions:	
	Calculated mass of material produced in barn operation & applied it to paddocks as imported organic fertiliser (<u>key</u> component to revised assessment).

Round two outputs

			Post- conversion					
		Pre- conversion	A to B - CC Pasture	C to D - CC Lucerne	A to B Maize	B – Grazed pasture	Total	
N fertiliser	kg/ha	60	155	35	218	16	140	
N fixation	kg/ha	150	83	324	2	48	113	
N effluent	kg/ha		0	0	0	0		
<u>N leaching</u>	<u>kg/ha</u>	<u>13</u>	9	<u>3</u>	<u>4</u>	8	<u>5</u>	
Organic pool	kg/ha	98	0	-87	-55	-339	-64	
N concentration	ppm		7.6	14.4	2.5	6.4		
Drymatter production	Kg DM/ha		9,917	11,973	15,000	9,874		
Farmer anticipated drymatter production	Kg DM/ha		10,000	12,000	15,000	10,000		



Reality check



		Basic, o	conserva			
Item		mas	s balanco	B – Grazed pasture	Total	
Area	ha	Mass ba	alance sh	nows	25	528
N applied	kg N/ha	that N st	tatus ove ea is a du	16		
Clover fixation	kg N/ha	(N s	hortage)	150		
Total N in	kg N/ha	200	235		166	
Dry matter	kg DM/ł				10000	
N concentration	%	Supports the view that N leaching will be			2.5%	
N uptake	kg N/ha	li	mited.	250		
N removal	%			15%		
Total N removal	kg N/ha	225	270	270	38	
Surplus	kg N/ha	55	-35	-52	129	-14

The so what

