Modeling N surplus and N leaching

Elodie Ruelle

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Animal and Grassland Innovation Centre, Teagasc, Moorepark

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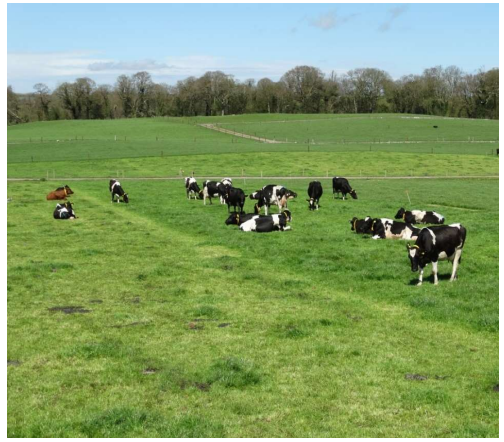
Plan



- Scenarios presentation
- Main outputs
- Precision N management: 2018 example

Elodie.ruelle@teagasc.ie

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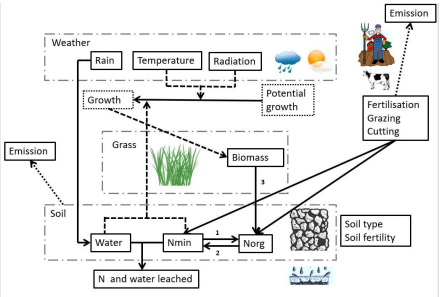
Scenarios

- Requested by Department of Agricultural, Food and Marine
- Base simulation:
  - Free draining soil
  - SR of 2.75 cow/ha (org N of 250 kg/ha)
  - 250 kg of chemical N applied (from 16 of January to 16 of September)
- Chemical N
  - Reduction of 10 or 20%
  - Using excessive level above 250 kg N/ha
- None compliant slurry spreading during closed period
  - 12% or 25% spread in December
- Stocking Rate (SR) variation
  - 10% reduction of SR
  - Platform SR (platform of 3.73 or 4.72 cow/ha)



18 years of weather data -> inter year variability

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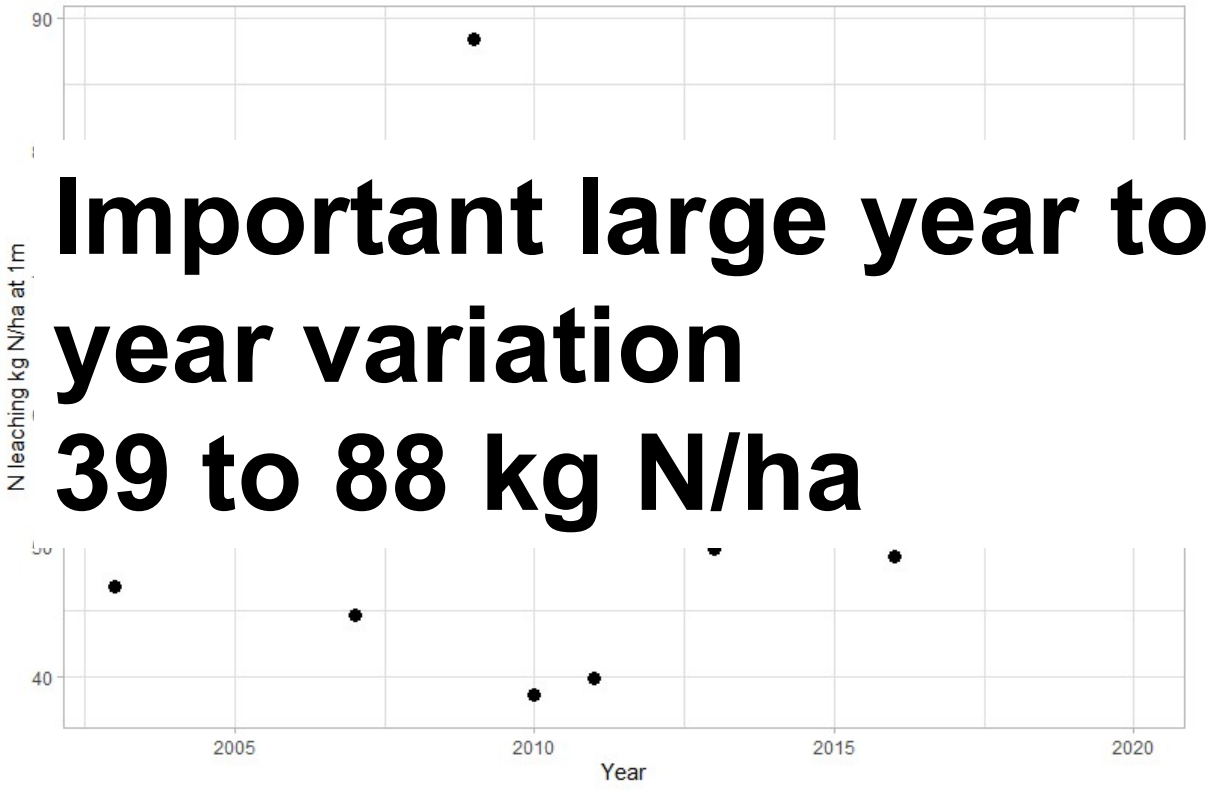
Year to year variation in N leaching



Important large year to year variation
39 to 88 kg N/ha

- Same management
- Same SR
- Same N application

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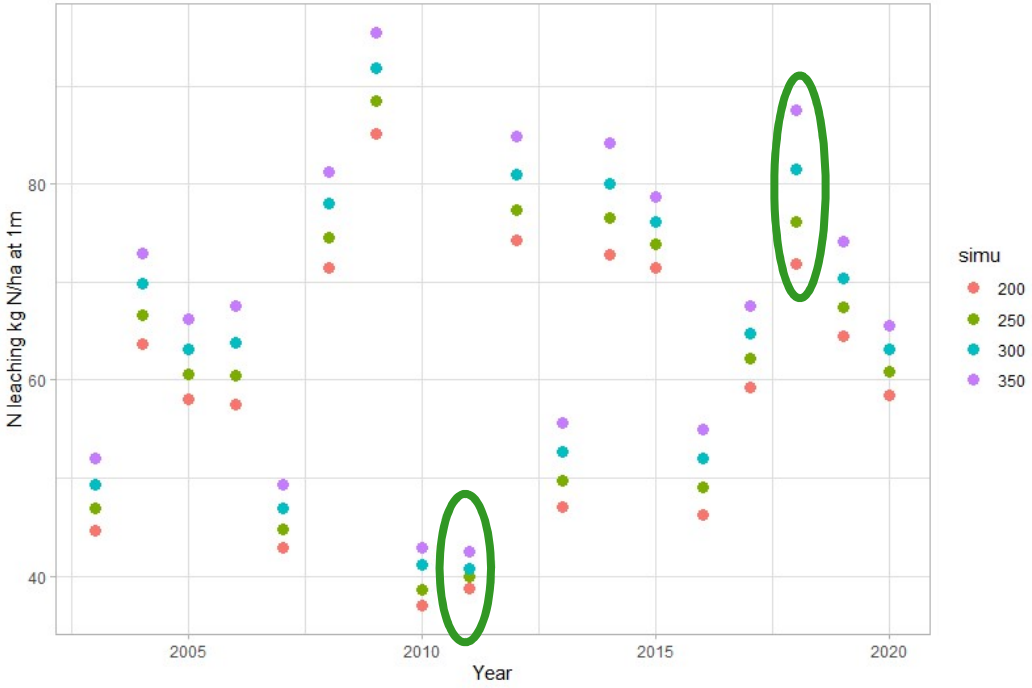
N fertiliser application



N fertiliser applied	Yearly N leaching	% reduction
200	59.1	-4.5%
225	60.5	-2.3%
250	61.9	
300	64.8	+4.7%
350	68.0	+9.9%

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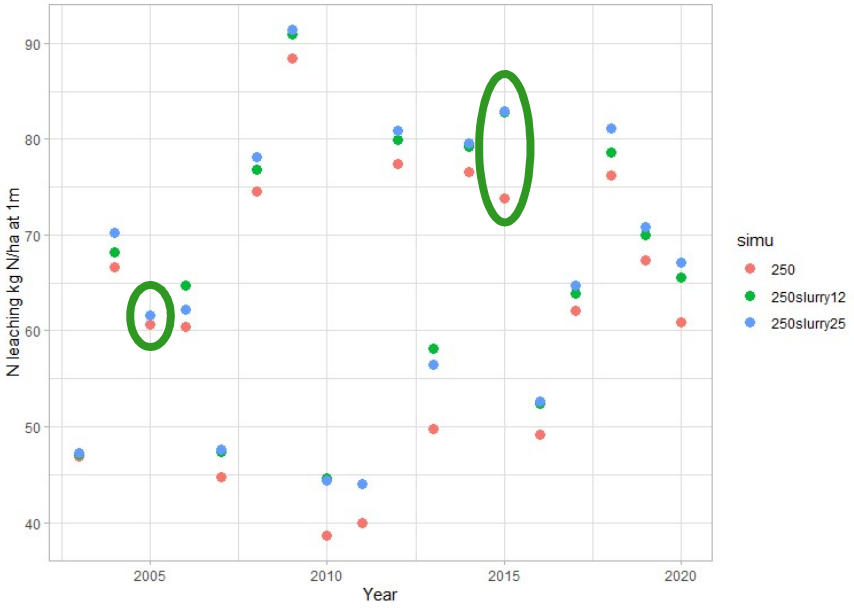
Influence of Slurry Spreading During Closed Period



Paddock concerned

% spread mid December	Yearly N leaching	% variation
0	61.9	
12%	65.1	+5.2%
25%	65.4	+5.7%

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Effect of Stocking Rate on N Leaching

Organic N (SR)	Yearly N leaching	% variation
268 (2.95)	63.2	+2.1%
250 (2.75)	61.9	
230 (2.50)	60.2	-2.7%

Grazing Platform			Full Farm (40 ha)		
Organic N (SR)	Yearly N leaching	% variation	Organic N (SR)	Yearly leaching	% variation
250 (2.75) (40 ha)	61.9		250 (2.75)	61.9	
340 (3.70) (30 ha)	67.6	+9.2%	250 (2.75)	62.7	+1.3%
430 (4.60) (24 ha)	73.7	+19.1%	250 (2.75)	63.5	+2.6%

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PRECISION MANAGEMENT

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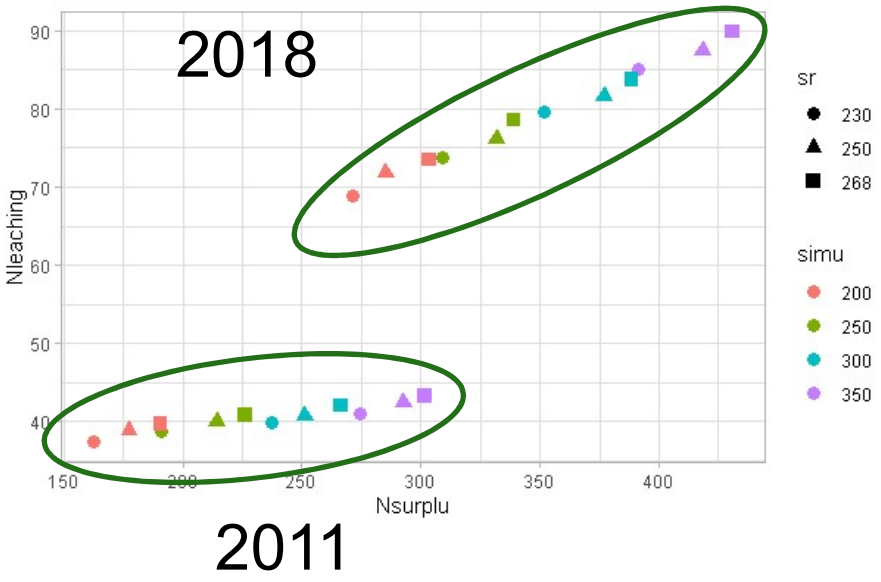
Relationship N leaching/N surplus
2 contrasting years



The worst year is the year we have the most to gain!!!!

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Precision management: the 2018 example

Specific rules:

- Spring: predicted grass growth <10 kg of DM/ha; delayed N application
- Spring: rainfall in the 3 next day high; delayed N application
- 24 kg of N in March never applied (Beast from the East); no growth for almost 3 weeks,
- main grass-growing season, predicted grass growth <25 kg of DM/day end of N application

This resulted in a total chemical N application of **171** kg of N/ha for 2018 (a reduction of 79 kg of N/ha)

Year	Nitrogen (kg/ha)	Grass growth (kg DM/ha)	Grass intake (kg DM/cow)	Silage intake (kg DM/ha)	Con. intake (kg DM/ha)	N leaching (1m) (kg /ha)	Milk solids (kg MS/cow)	Nitrogen surplus (kg N/ha)	NUE (%)
Avg.	250	13,752	3,255	1,099	932	62	434	227	28.8
2018	250	8,987	2,352	1,680	1.215	77	414	306	22.4
2018	171	8,728	2,483	1,569	1,154	65	412	224	25.8

N response 3.3!!!!!

-12 kg N/ha

-82 +3.4%

Conclusion

- Large year to year variation in N leaching therefore large potential for precision N application
- Reducing N surplus/ha had a significant benefit in reducing N leaching
- Eliminating the practice of over use of chemical N fertiliser and the spreading of slurry during the closed period will improve water quality

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Thank you for your attention

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