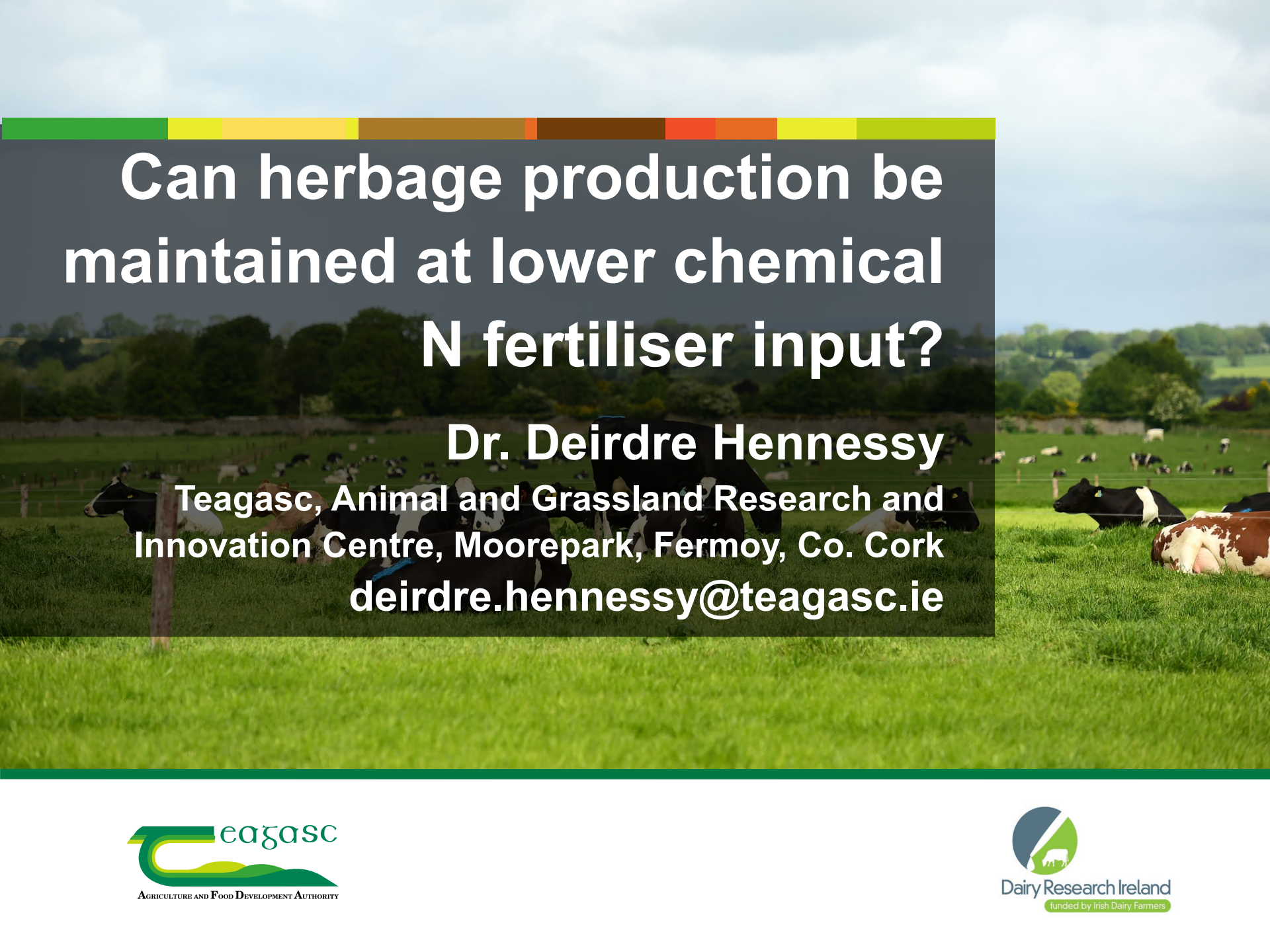

Can herbage production be maintained at lower chemical N fertiliser input?

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Teagasc
Agriculture and Food Development Authority

Dairy Research Ireland
funded by Irish Dairy Farmers

On-going and future challenges

- European Green Deal Targets
  - 20% reduction in fertiliser
- Nitrates Derogation
- Water quality & GHG emissions
- Image & social licence

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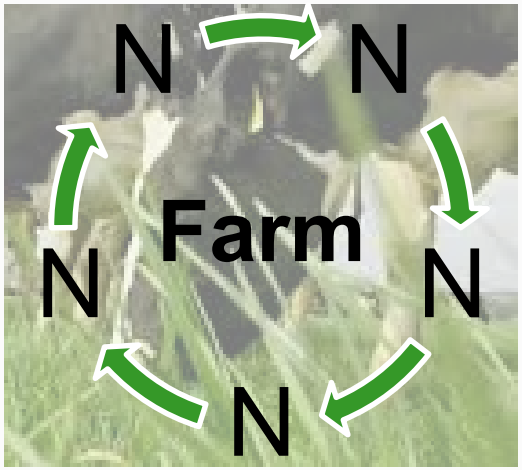
Predicted effect of 20% reduction in chemical N fertiliser on grass-only swards (Teagasc, 2020)

	Herbage production (t DM/ha)		Feed deficit (t DM/ha)	
Stocking rate (cows/ha)	250 kg N	200 kg N	250 kg N	200 kg N
2.5	14.0	13.2	0	-0.5
2.75	14.2	13.4	-0.8	-1.4
3.0	14.3	13.5	-1.6	-2.2

- Reducing N fertiliser = increased feed deficit
  - Reduce stocking rate
  - Increase purchased feed
  - Increased focus on N use

Farm gate N use efficiency

N entering the farm



N leaving the farm

Industry target – 35% N use efficiency

Farm gate N use efficiency

	National average 2019 (NFS data)
Stocking rate (LU/ha)	2.11
Concentrate (kg/cow)	1144
N fertiliser applied (kg/ha)	177
Herbage production (t DM/ha)	10.5
Milk solids yield (kg/ha)	901
N surplus (kg N/ha)	176
N use efficiency (%)	24

Farm gate N use efficiency

	National average 2019 (NFS data)	Moorepark Grass only (2013-2016)	Moorepark Clover150 (2013-2016)
Stocking rate (LU/ha)	2.11	2.6	2.6
Concentrate (kg/cow)	1144	357	357
N fertiliser applied (kg/ha)	177	229	156
Herbage production (t DM/ha)	10.5	13.6	13.6
Milk solids yield (kg/ha)	901	1261	1339
N surplus (kg N/ha)	176	141	63
N use efficiency (%)	24	40	58

Two areas to focus on for better use of N

- Nutrient management
  - Slurry management
  - Mid-season nitrogen management
- White clover contribution on farm

Make better use of slurry

Splash plate

- Average available N - 46%

LESS - Trailing shoe

- Average available N - 65%

Available N per 1,000 gal cattle slurry

	Spring	Summer
Available N (kg/ha)	6	3

Spring	Summer
9	6

Make better use of slurry

Splash plate

- Average available N - 46%

LESS - Trailing shoe

- Average available N - 65%

Available N per 1,000 gal [illegible] rry

	Spring	S[illegible]	[illegible]mmer
Available N (kg/ha)			[illegible]6

Spring before summer for best use of slurry N!

Plan slurry use

- Spring
  - 2,500 gals/ac = 23 kg N/ha (LESS)
  - Use instead of N fertiliser on up to ⅔ of milking platform

Jan./Feb.	⅓ of milking platform with lowest covers
Feb./Mar.	⅓ of milking platform grazed first

- Silage ground
  - 2,500 gals/ac = ~15-20 kg N (LESS)
  - Reduce N fertiliser accordingly

If you are using LESS you should be spending <u>less</u> on fertiliser

Plan slurry use

- Spring
  - 2,500 gals/ac = 23 kg N/ha (LESS)
  - Use instead of N fertiliser on up t… …rm

Jan./Feb.	⅓ of milking platform … …s
Feb./Mar.	⅓ of milking platform gra…d first

Average N fertiliser reduction 15 kg N/ha on the milking platform

- Silage ground
  - 2,500 gals/ac = ~15-20 kg N (LESS)
  - Reduce N fertiliser accordingly

If you are using LESS you should be spending less on fertiliser

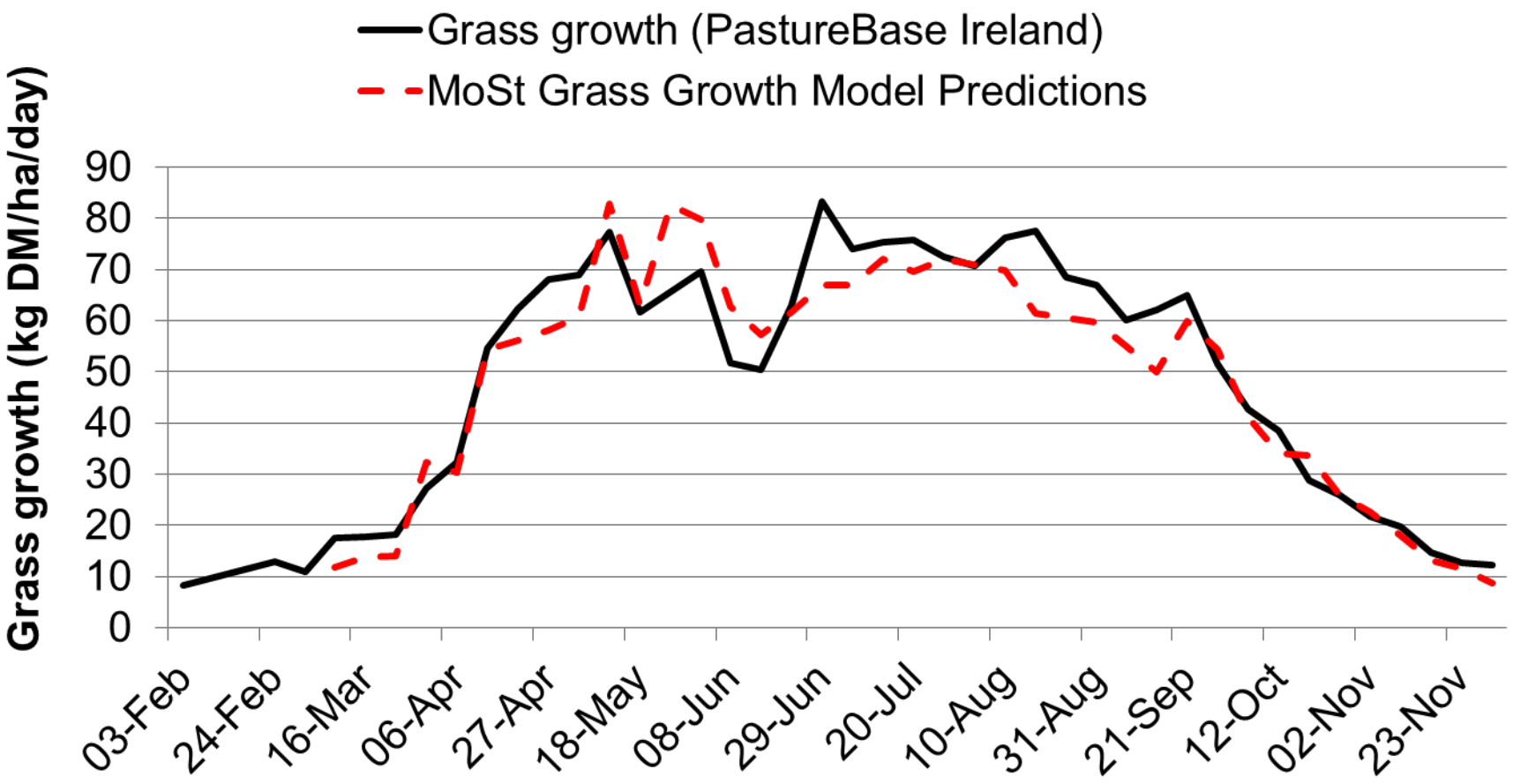
Mid-season N fertiliser management

Main factors to consider

- Soil N mineralisation
  - Increases with increasing temperature
  - Moisture also necessary
  - 180 – 240 kg N/ha/year – most in summer

- Planning summer N application
  - Measure!
  - Use available information
    - » Current farm cover and grass wedge
    - » Predicted grass growth (MoSt Grass Growth Model)

Mid-season management



Source: E. Ruelle (2020)

Developing your mid-season N fertiliser plan

- How much grass do you need?
- How much grass is on the farm?
- What growth is predicted?
- Use any available slurry
- Be aware of weather/growing conditions
  - Influence on mineralisation

Calibrate your fertiliser spreader

Consider using GPS for fertiliser spreading

Developing your mid-season N fertiliser plan

- How much grass do you need?
- How much grass is on the farm?
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  - Influence on mineralisation

Making surplus bales every rotation???
REDUCE N fertiliser

Calibrate your fertiliser spreader

Consider using GPS for fertiliser spreading

White clover

Moorepark Grass250 *v* Clover150 (2013-2020)

	Grass-only 250 kg N	Grass-white clover 150 kg N	Difference
Stocking rate (cows/ha)	2.74	2.74	-
Annual herbage production (t DM/ha)	13.5	13.4	-0.1
Silage conserved (t DM/cow)	1.00	0.98	-0.02
Silage fed during lactation (kg DM/cow)	259	333	+74
Average sward clover content (%)	-	22.0	-
Milk yield per cow (kg)	6,068	6,331	+243
Milk solids yield per cow (kg)	490	510	+20
Concentrate fed (kg/cow)	438	438	-
N use efficiency (2013-2016) (%)	40	58	+18

Benefits of white clover

- Increased herbage production
  - Up to 1.5 t DM/ha
- Increased milk solids production
  - 20 – 50 kg MS/cow
- Fixes N for plant growth
  - Reduce requirement for N fertilser

~20% average clover content for sward and animal benefits

White clover management

Same grazing management targets as grass only swards

Clonakilty
Moorepark

1. Spring targets
2. Early N + Slurry
3. Minimise poaching

Potential to reduce N fertiliser

1. Pre-grazing yield
2. Residuals
3. Reseed/Oversow

1. Build rotation
2. Autumn targets
3. Residuals

Sward clover content (%)

40
35
30
25
20
15
10
5
0

Feb Mar Apr May Jun Jul Aug Sept Oct Nov

Month

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N fertiliser application strategy (kg N/ha)

Date (Rotation)	Grass 250	Grass Clover 150
Mid-late January	28	28
Mid March	28	28
April (2nd rotation)	33	33
May (3rd rotation)	30	9
May (4th rotation)	30	9
June (5th rotation)	17	9
July (6th rotation)	17	9
July (7th rotation)	17	9
August (8th rotation)	17	9
Mid September	33	12

N fertiliser application strategy (kg N/ha)

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June (5th rotation)	17	
July (6th rotation)	17	
July (7th rotation)	17	
August (8th rotation)	17	9
Mid September	33	12

100 kg N/ha reduction

White clover presents a huge opportunity to reduce N fertiliser with NO effect on herbage production

Getting clover established on your farm

Summary

If you do nothing costs will increase – increased purchased feed or reduced stocking rate

- Apply slurry with LESS and Spring before Summer – reduce N fertiliser by 15 – 20 kg/ha
- Mid-season – measure and use available information to plan N fertiliser
  - Surplus bales EVERY rotation ⟹ opportunity to reduce N
- White clover
  - Replace up to 100 kg N/ha or 40% of chemical N fertiliser

Take home messages

- Optimise soil fertility
- Make better use of N on your farm
  - Slurry – LESS, spring before summer
  - Plan mid-season N
- Reseed and over sow clover this year to allow reductions in N fertiliser in summer