Soil Fertility Progress - Heavy Soils Programme Farms 2014-2016

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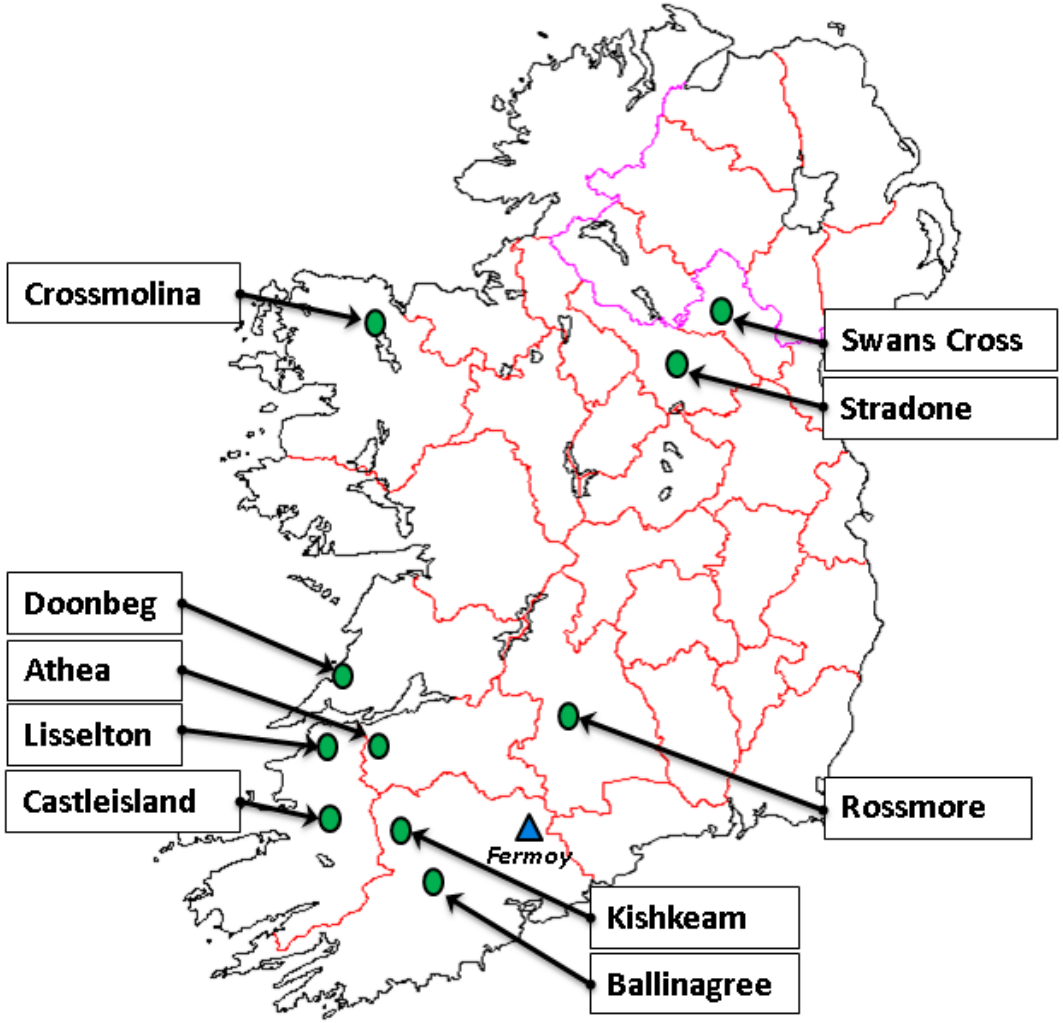
Teagasc Heavy Soils Programme

Outline

- Background Heavy Soils Farms
- Lime/PH Progress & Impact
- Phosphorus & Pottasium progress
- Grass Growth
- Issues around building Soil P
- Farm Focus on increasing % of farm at optimum soil fertility
- Conclusion

Heavy Soils Programme Farms



Key Physical Performance 2016

2016	Cow Numbers	Milking Block SR Lu/Ha	MS/ha (Milking block)	Kg MS/cow	6 week calving %
Spring calving Kerry grp Suppliers n=182	95	**2.53** [2.1 Lu/ha whole farm]	1053	415	67
Heavy Soils Farms (n=7)	101	**2.58** [1.85 Lu/Ha Whole farm]	1132	439	79

Heavy Soils Farms increased Milk Solids Production by 20% since 2014 (Avg 90 cows)

Financial Performance 2016

	Feed	Fertiliser	Total Variable	Machinery	Total Fixed	*Total Costs c/l	*Total Costs €/kg MS
Spring calving Kerry grp Suppliers n=182	3.96	2.65	11.85	1.13	7.81	19.66	2.49
Heavy Soils N=7	**3.39**	**2.85**	**11.3**	**1.13**	**7.68**	**18.94**	**2.36**

* Excludes own labour, tax, capital repayments, heifer rearing

- Heavy Soils farms are very efficient relative to peer group in same Region

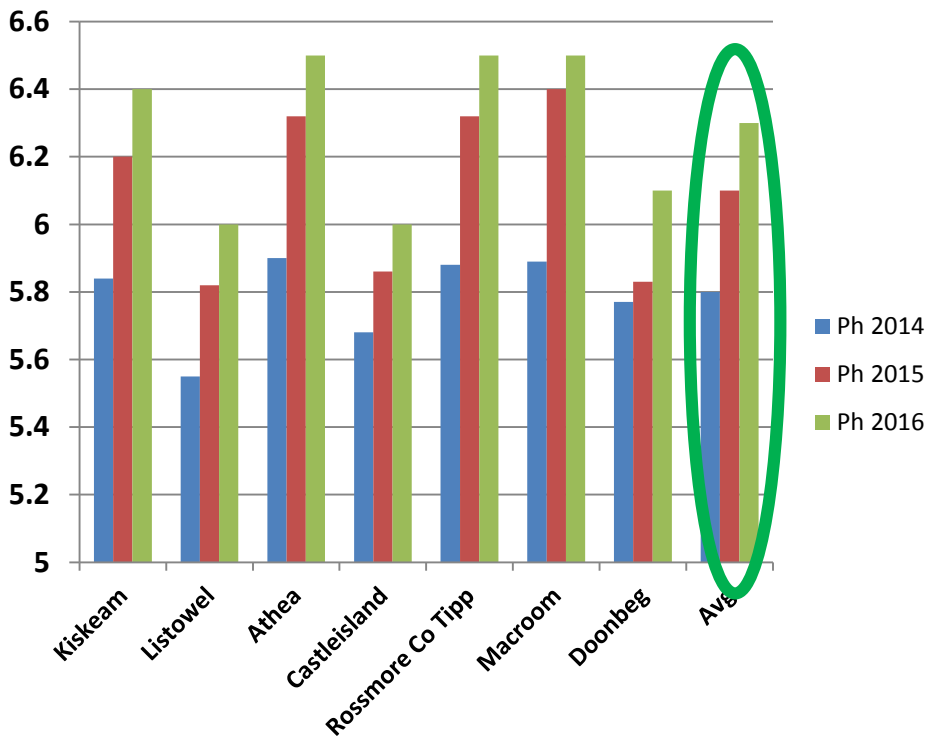
Lime Requirement

2013 NMP	Cost of Lime	Annual cost for 3 Years
Lime requirement tonnes (n=7 farms)		
	€	€
278	5836	2075

Average annual farm application
92 tonnes Lime 2014-2016

PH Progress 2014 -2016 (N=7)

	PH		
	2014	2015	2016
Kiskeam	5.84	6.2	6.4
Listowel	5.55	5.82	6
Athea	5.9	6.32	6.5
Castleisland	5.68	5.86	6
Rossmore Co Tipp	5.88	6.32	6.5
Macroom	5.89	6.4	6.5
Doonbeg	5.77	5.83	6.1
Avg	**5.8**	**6.1**	**6.3**



Impact of Lime Application observed on HSP Farms.

- Paddocks that were at Ph 5.5 on HSP farms in 2013 and are now at Ph 6.3 are growing an additional 2 tonnes DM/ha in 2016.

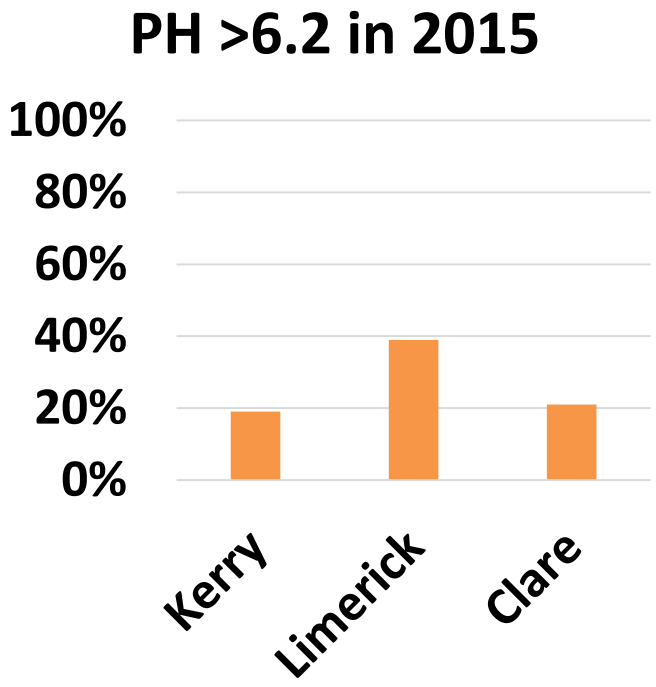
- Farms that are now at target pH notice a much faster response to applied fertilisers. When soil temperatures are good paddocks are easily achieving the 21 day pregrazing target of 1500kgs/ha .This has led to more surplus silage of high quality being harvested during the main growing season, an invaluable resource on a Heavy soil farm.

- In 2016 the Athea farm achieved an average Ph of 6.5. As well as supporting a Dairy herd stocking rate of 2.5 cows/Ha the farm also produced an additional 70 tonnes DM in the form of 390 surplus bales of silage equivalent to 10 bales/ha (almost 4 bales per cow).The farm grew 11.4t/ha and utilised 9t/ha.

- Paddocks are better grazed out by the herd and palatability of grass has improved.
- Grass has a better root structure, better tillering and less open swards.

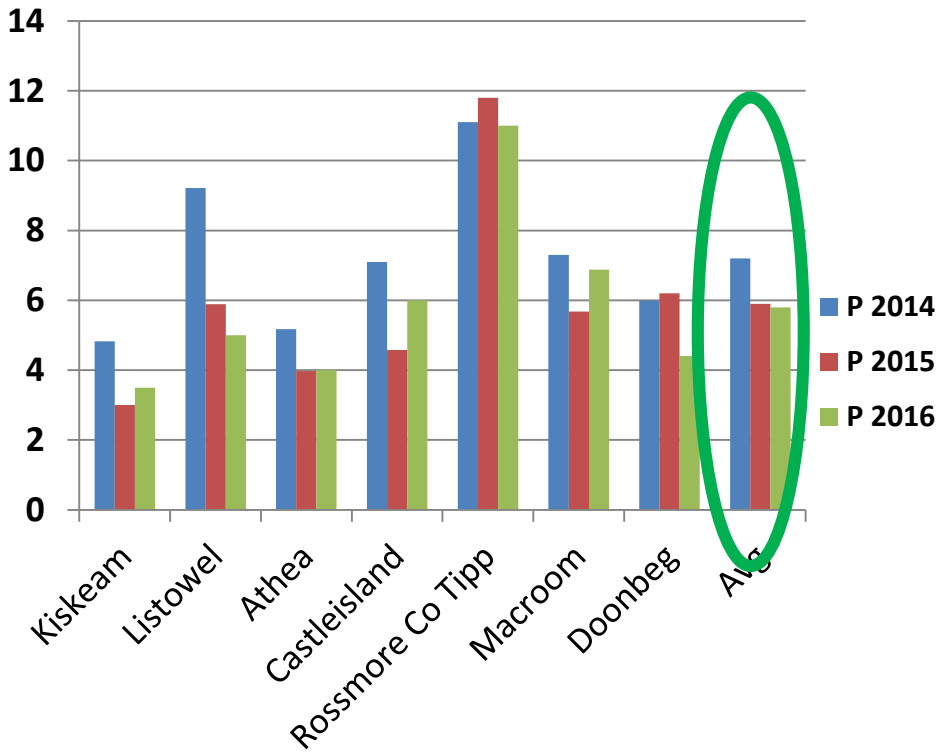
- Farmers aware of softening effect of excessive lime use, split application (max 2 tonnes per single application) has worked well in building pH without negatively affecting soil structure.

Soil Fertility Campaign 2016



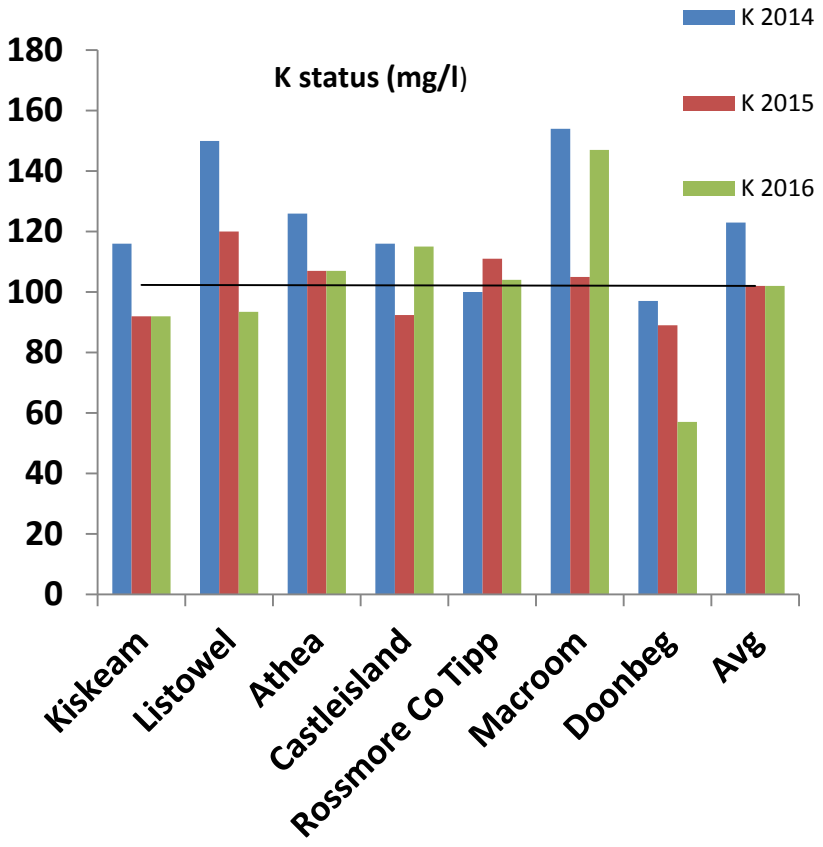
Phosphorus(mg/l) 2014-2016

	P (mg/l)		
	2014	2015	2016
Kiskeam	4.83	3	3.5
Listowel	9.22	5.89	5
Athea	5.17	3.97	4
Castleisland	7.1	4.58	6
Rossmore Co Tipp	11.1	11.8	11
Macroom	7.3	5.68	6.88
Doonbeg	5.99	6.2	4.4
Avg	**7.2**	**5.9**	**5.8**



Pottasium (mg/l) 2014-2016

	K mg/l		
	2014	2015	2016
Kiskeam	116	92	92
Listowel	150	120	93.5
Athea	126	107	107
Castleisland	116	92.4	115
Rossmore Co Tipp	100	111	104
Macroom	154	105	147
Doonbeg	97	89	57
Avg	**123**	**102**	**102**



Nutrient Input 2016

Total nutrient input (whole farm) HSP farms 2016

N	P	K
Kgs/Ha		
248	**37**	**139**

Chemical Fertiliser applied 2016 HSP farms

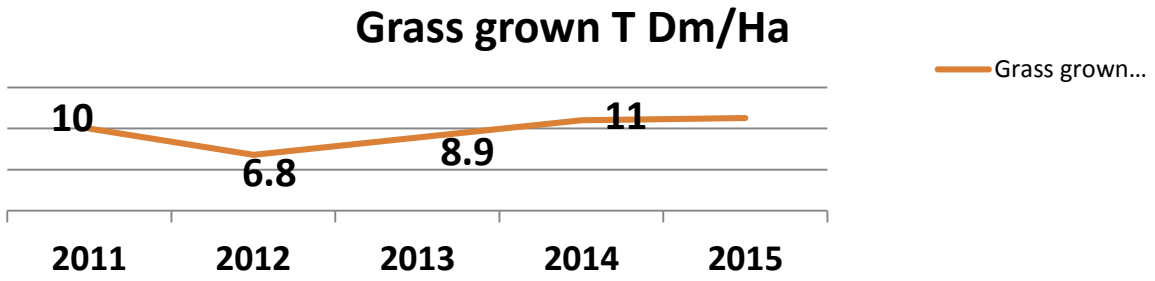
N	P	K
Kgs/Ha		
234	**25**	**47**

Slurry nutrient contribution 2016 HSP farms

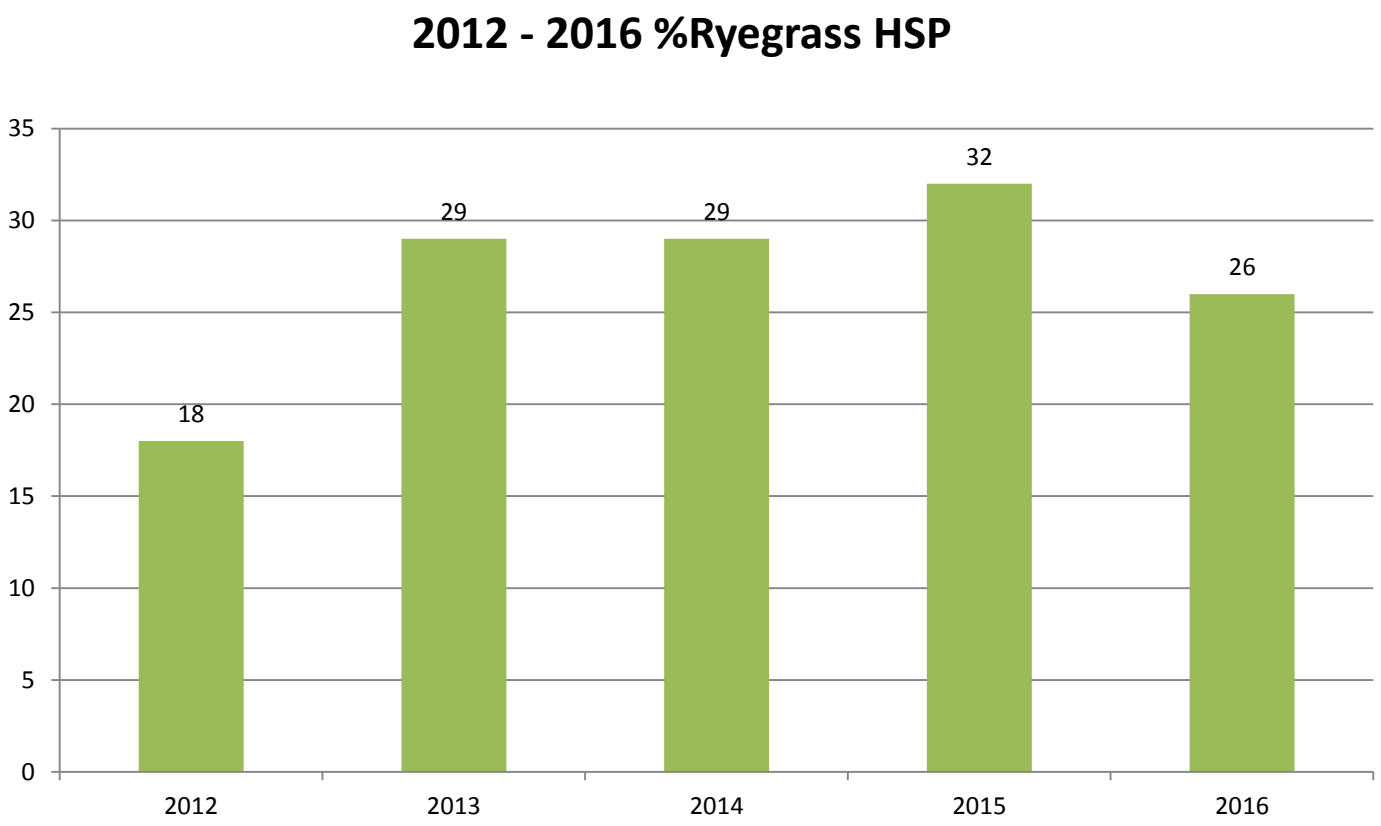
N	P	K
Kgs/Ha		
14	**12**	**92**

Grass Growth (T Dm/Ha) 2016

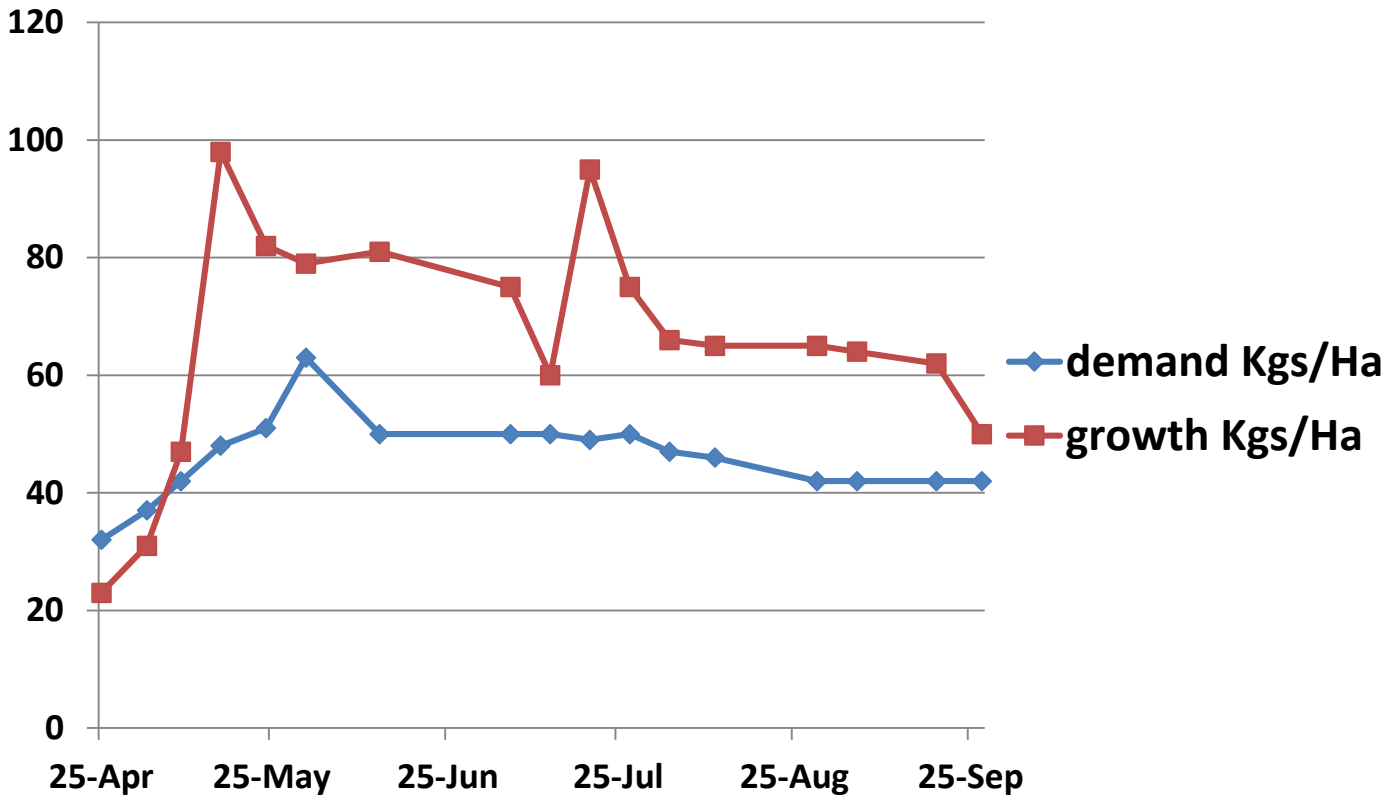
HSP Grass Measurement Data 2016							
	Milking block	start date	Number	T DM/Ha	Spring	Summer	Autumn
	Hectares	measurement	measures	>15 measures			
Heavy Soils Farms							
Doonbeg	36.8	13/01/16	36	**12.1**	0.2	8.3	3.6
Athea	39.3	03/02/16	42	**11.4**	0.6	7.3	3.5
Kiskeam	42.1	14/02/16	23	**9.2**	0.2	6.0	3.1
Castleisland	41.7	12/03/16	28	**11.6**	0.2	7.4	4.0
Listowel	31.3	29/01/16	22	**11.1**	0.4	7.5	3.1
Macroom	55.82	11/02/2016	25	**11.8**	0.35	7.66	3.8
Rossmore Co Tipp	31.31	01/01/2016	28	**12.7**	0.42	7.69	4.62
Average	**39.8**	**02/02/2016**	**29**	**11.4**	**0.3**	**7.4**	**3.7**



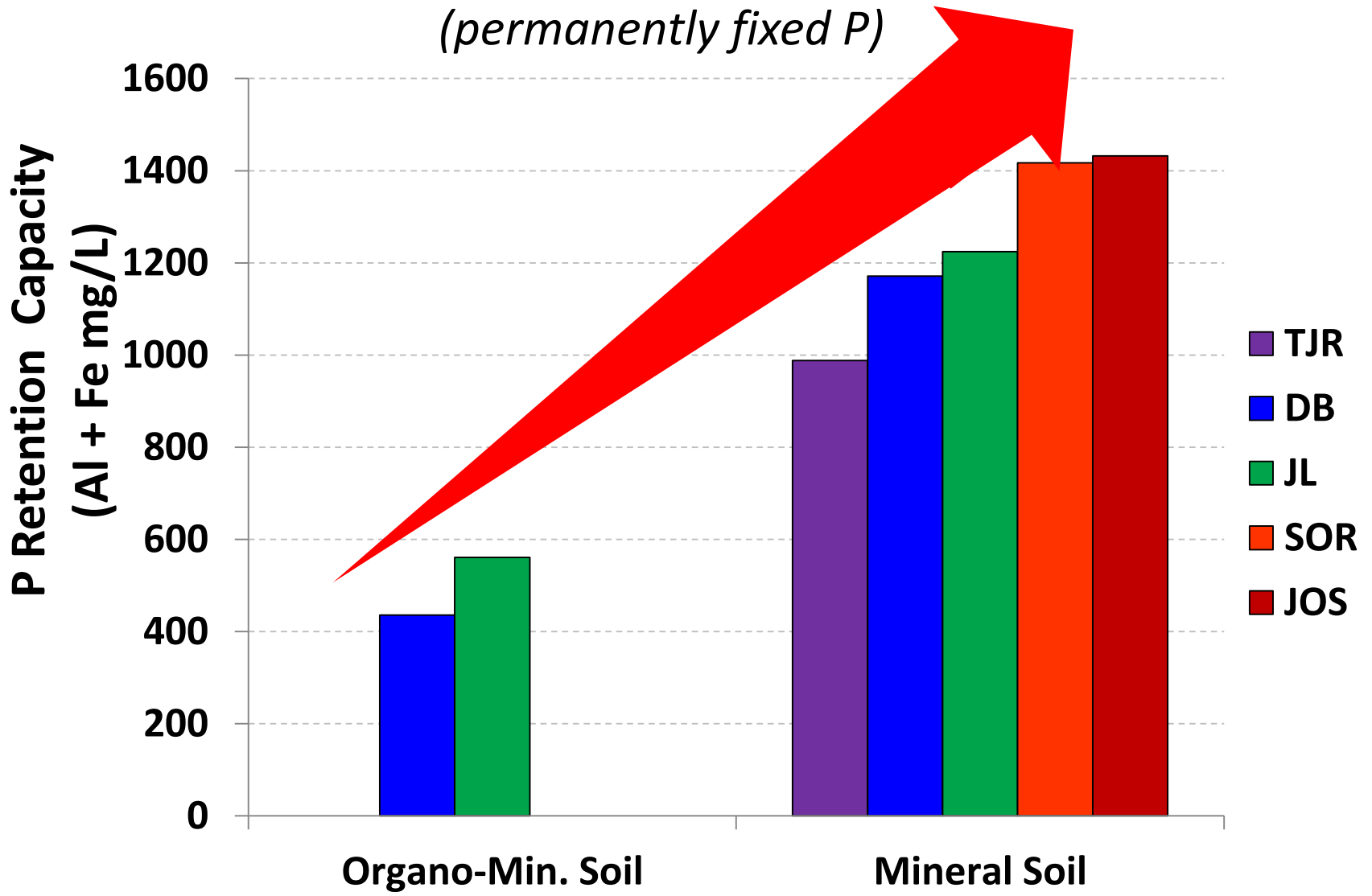
% Ryegrass HSP farms



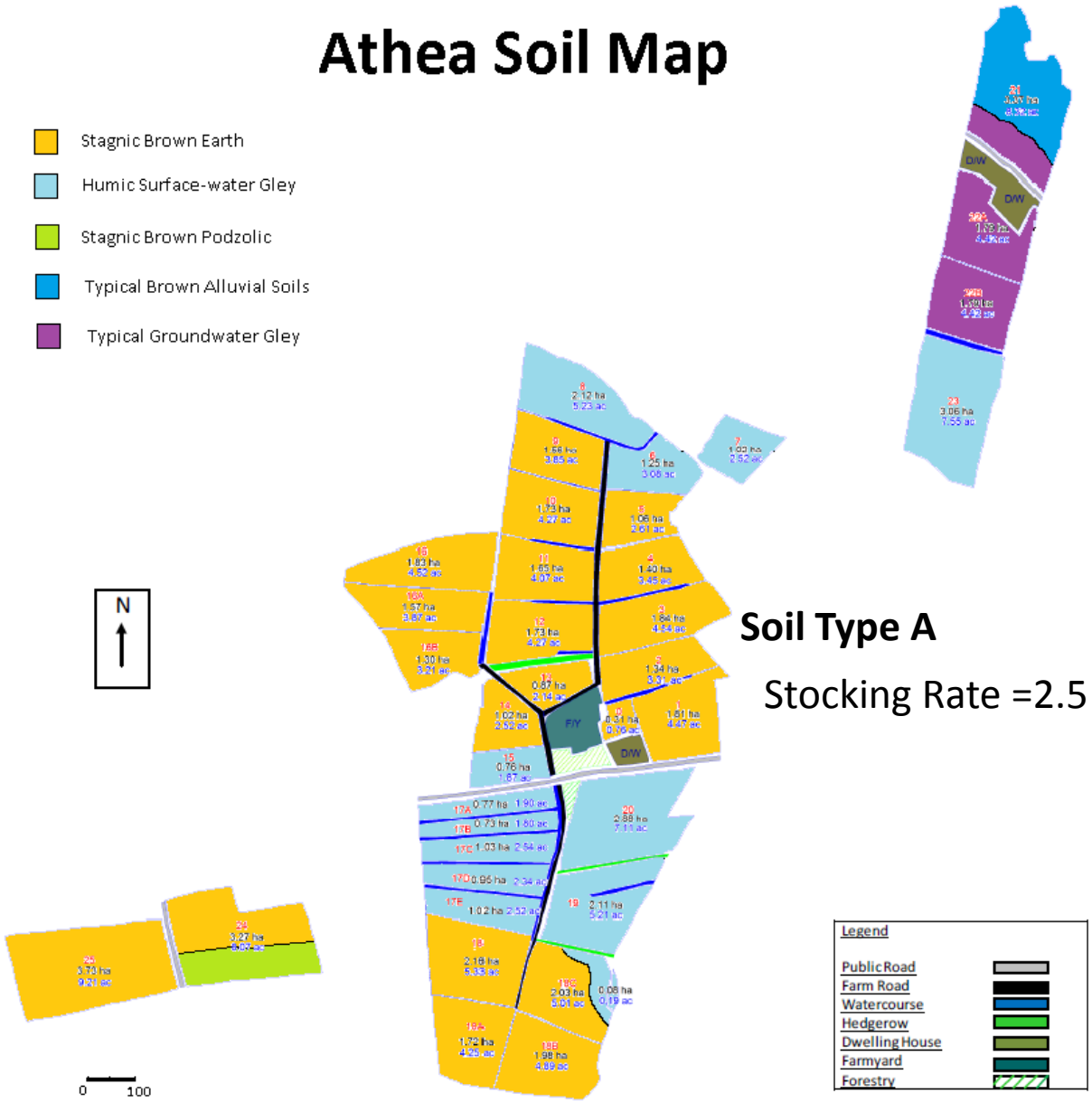
Mid-Season Grass Growth v Herd Demand Kg/Ha/day



Relative Soil P Retention Capacity



Athea Soil Map



Soil Type A

Stocking Rate =2.5 Lu/Ha

Slurry	15 October to 15 January	**Grassland**	161 kg/Ha
FYM	1 November to 15 January		

Soil Fertility Summary

Athea Farm 2017 NMP

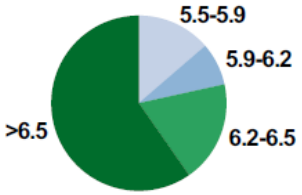
Overall Fertility Status

pH > 6.2, P & K index 3 or 4

	Ha's	%
Yes	9.76	16%
No	50.98	84%

Lime

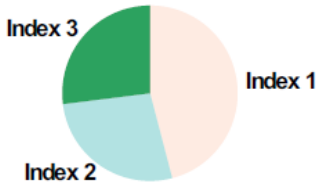
Soil pH > 6.2



pH	Ha's	%
<5.5	0.00	0%
5.5-5.9	8.31	14%
5.9-6.2	4.78	8%
6.2-6.5	11.39	19%
>6.5	36.26	60%

Phosphorus

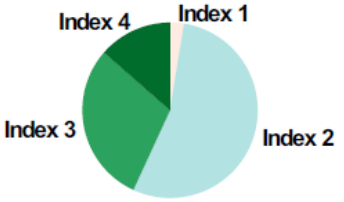
P Index



Index	Ha's	%
1	27.9	46%
2	16.46	27%
3	16.38	27%
4	0.00	0%

Potassium

K Index



Index	Ha's	%
1	1.54	3%
2	32.98	54%
3	17.96	30%
4	8.23	14%

%reduction in farm capacity to perform based on current fertility levels compared to optimal fertility

pH, P and K	pH	P	K
100	100	100	100

Soil pH & Lime

Lime Planned

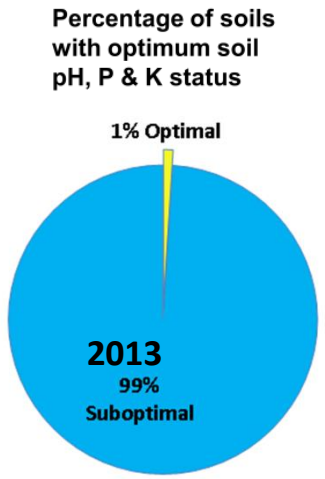
2017 82 Tonnes

Target pH	Grass	Tillage
Mineral Soil	6.3	6.5
Organic Soil	5.5	5.5

Comparison of Better Soil Type paddocks v Whole Milking Block 2016
Athea Farm

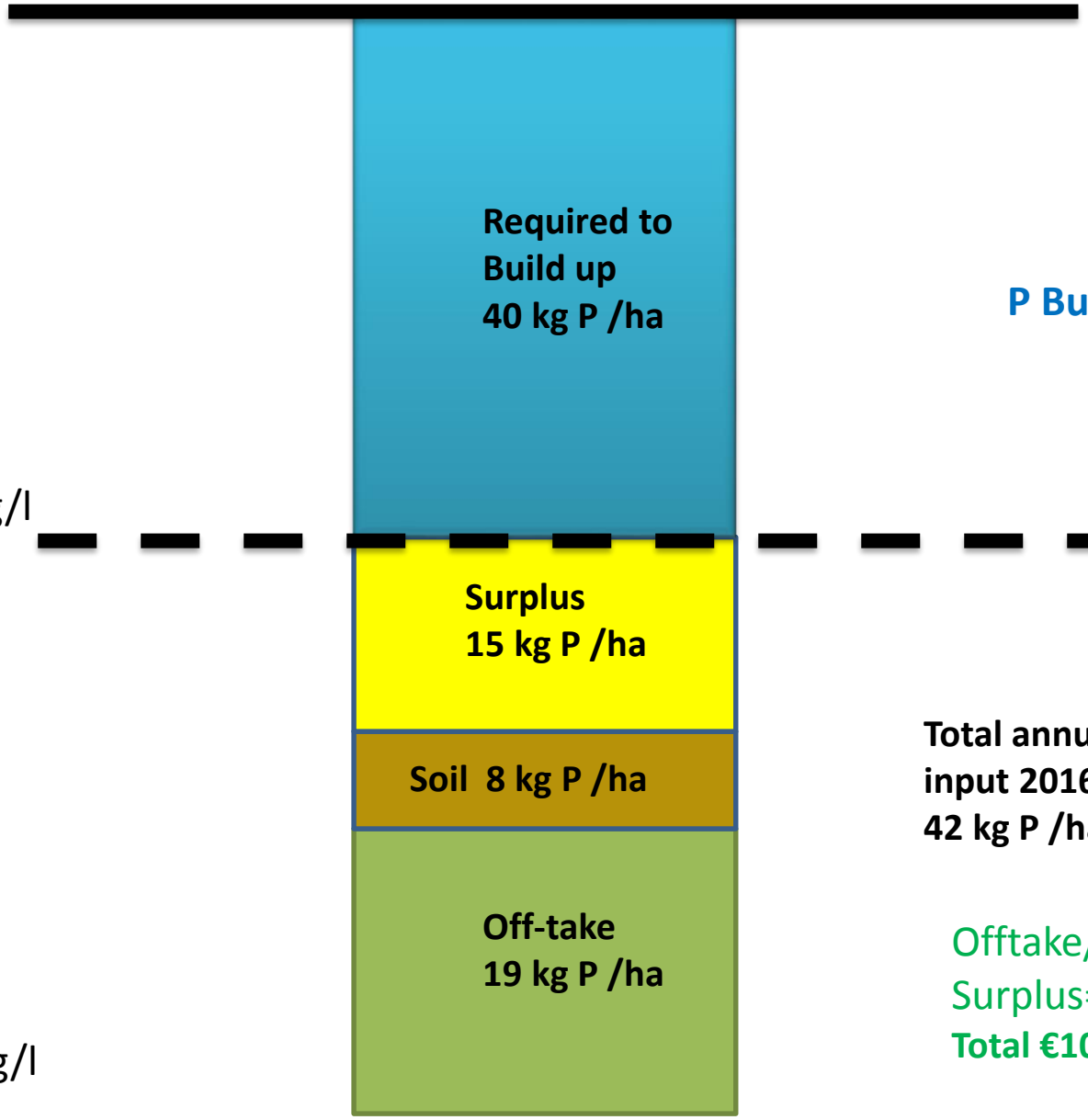
Area	Ha	K 2015	K 2016	P2015	P2016	PH 2015	PH 2016
Milking Block	39.5	104	111	3.7	4.1	6.2	6.6
Soil Type A	21.6	116	127	4.9	5.2	6.5	6.8

			Nutrient input 2016	
Area	Ha	Grass grown/ha	P Kgs/Ha	K Kgs/Ha
Milking Block	39.5	11.4	45.6	193
Soil Type A	21.6	12.5	42.1	118



Increased to 16% optimal in 2016

Athea Farm Soil Type A Phosphorus inputs (slurry & chemical) required to meet crop & soil requirements and Build P status



P Build up c €100/ha

Total annual input 2016: 42 kg P /ha.

Offtake/Soil=€64/ha
Surplus= €36/ha (slurry)
Total €100/ha

Implementing NMP 2017
Paddock focus on 60 Ha Athea farm

(10.3 Ha) Ph =6.9 P=4.2 K=104

Jan-March

- Pdks get Slurry (2500gals/ac or High P/K Compound late Mar (eg 2 bags 18 6 12/ac))
- Urea top up N

April-Sept

Slurry or High P/K compound

(Eg 6 bags 18 6 12/acre)

Urea Top up N

Chemical P applied =34kgs/ha

Slurry P applied=16kgs/ha

K Applied 163kgs/ha

50 ha

- Slurry (100,000 gals)Index 1 & 2 soils
- High P/K cpd (eg 3.3 bags 18 6 12/ac)
- Urea Top up N
- Potash 50%K Top up K

Chemical P applied 25 kgs /ha

Slurry P applied = 5 kgs/ha

K applied 137 kgs/ha

Target the farm chemical P allowance of 1600 kgs

10.3 ha x 34kgs/ha =350kgs + 50 ha x 25kgs/ha = 1250kgs

Messages from Heavy Soils Programme experience

- Do a comprehensive soil test of all paddocks at least every two years
- Correct lime deficiency based on lime requirement. On heavy soils limit lime application to 2 tonnes/acre in any single application
- Be opportunistic in spreading lime throughout year
- Use your soil results to set up a fertiliser plan and know the total amount of P fertiliser you are allowed spread. New Nutrient Management plans will have colour coded maps indicating the paddocks with low Indices for P& K or high lime requirement.
- Use of the low ground pressure umbilical & trailing shoe systems of slurry spreading have revolutionised the ability of HSP farms to get more slurry spread in the spring time, however great care must be exercised to avoid runoff losses from close to saturated heavy soil types.
- Split your P allowance applying 50% in spring and remainder in July/Aug.-apply on a little and often basis
- Ensure that Phosphorus content of compound fertiliser used is high enough to meet requirements
- Prioritise lime/fertiliser spending above other lower return costs

Conclusion

- Correct Soil PH….Get lime on first.
- Needs a definite lime application plan
- Treat lime the same as any other fertiliser.
- Consider PH maintenance-it will be higher in high rainfall areas
- Consider your soil type and its P “Lock-up” capacity
- High P and K compounds…a little and often
- Use your NMP Plan to increase the number of Paddocks with optimum soil fertility.
- Steady progress can be achieved in lifting Soil Fertility over time with the correct focus.