

Response to Potassium & Implications for Grass Silage Production

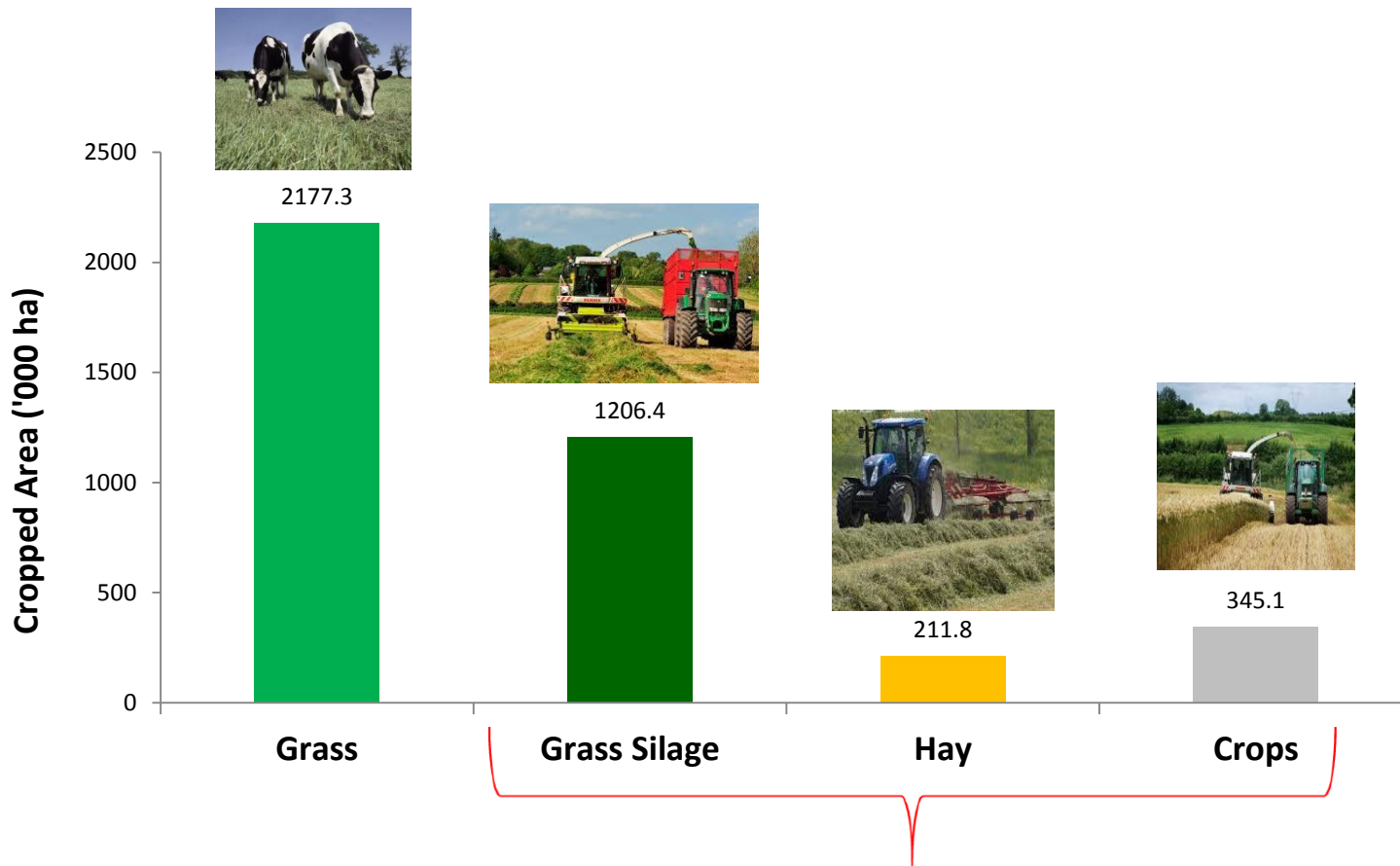


Soil Type	pH	CEC	Potassium (K)	Calcium (Ca)	Magnesium (Mg)	Sulfur (S)	Nitrogen (N)	Phosphorus (P)	Zinc (Zn)
10000000	6.5	15	150	100	50	10	10	10	10
10000001	6.5	15	150	100	50	10	10	10	10
10000002	6.5	15	150	100	50	10	10	10	10
10000003	6.5	15	150	100	50	10	10	10	10
10000004	6.5	15	150	100	50	10	10	10	10
10000005	6.5	15	150	100	50	10	10	10	10
10000006	6.5	15	150	100	50	10	10	10	10
10000007	6.5	15	150	100	50	10	10	10	10
10000008	6.5	15	150	100	50	10	10	10	10
10000009	6.5	15	150	100	50	10	10	10	10
10000010	6.5	15	150	100	50	10	10	10	10
10000011	6.5	15	150	100	50	10	10	10	10
10000012	6.5	15	150	100	50	10	10	10	10
10000013	6.5	15	150	100	50	10	10	10	10
10000014	6.5	15	150	100	50	10	10	10	10
10000015	6.5	15	150	100	50	10	10	10	10
10000016	6.5	15	150	100	50	10	10	10	10
10000017	6.5	15	150	100	50	10	10	10	10
10000018	6.5	15	150	100	50	10	10	10	10
10000019	6.5	15	150	100	50	10	10	10	10
10000020	6.5	15	150	100	50	10	10	10	10

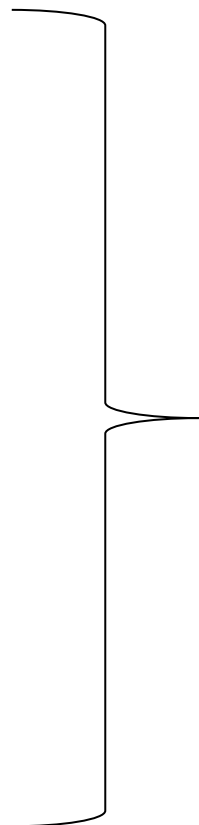
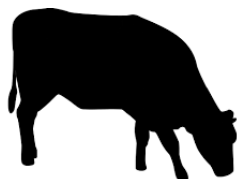
*Mark Plunkett, Teagasc,
Johnstown Castle, Wexford*



Land Use Areas and Main Crop Types



Annual Grass Silage Requirement?

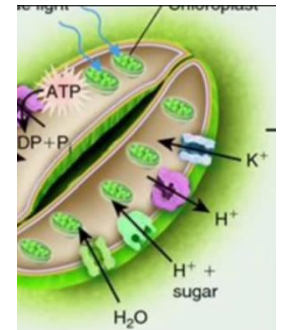


***10 million Ton
Dry Matter***

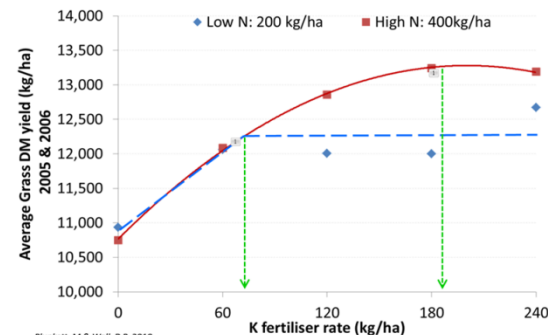


Potassium – Key Soil & Plant Nutrient

- Irish soils tend to have good reserves
- Soil K levels change relatively fast
- Water & Nutrient movement in the plant
- No legislative limits on K
- K Deficiency “The Hidden Hunger”
- N Uptake & Efficiency in the plant



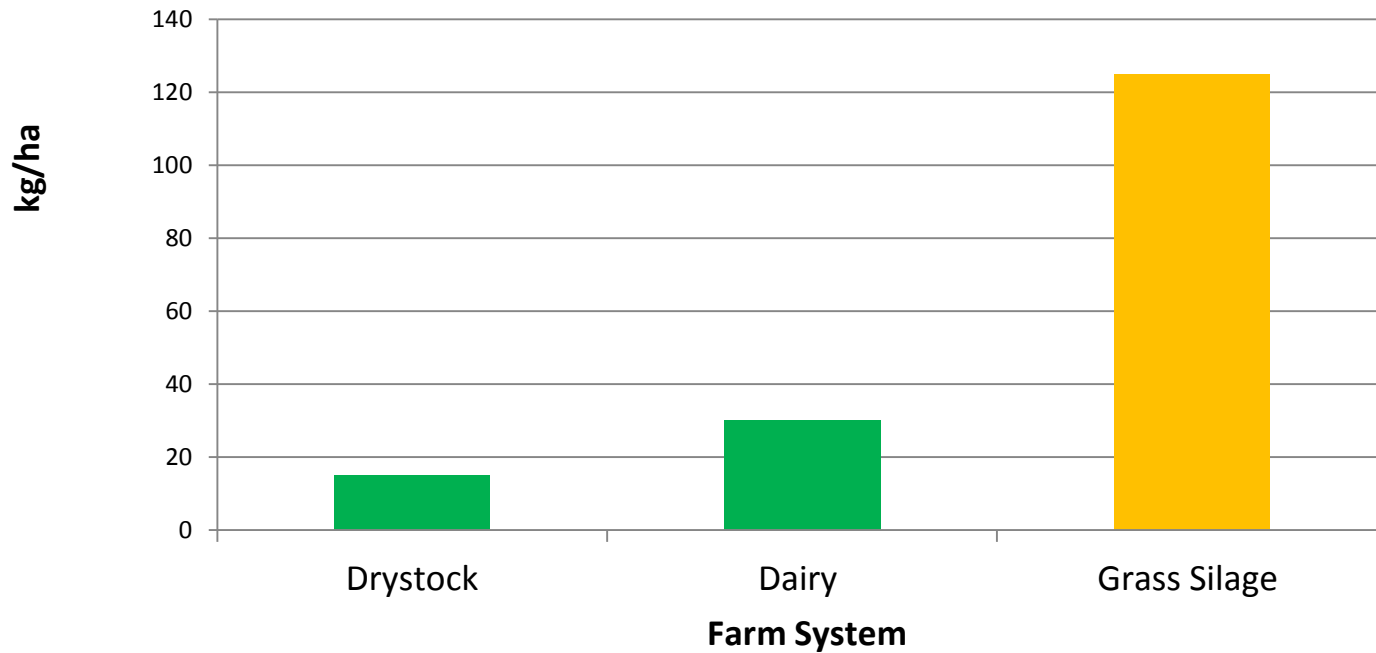
Importance of K when using high N fertiliser rates



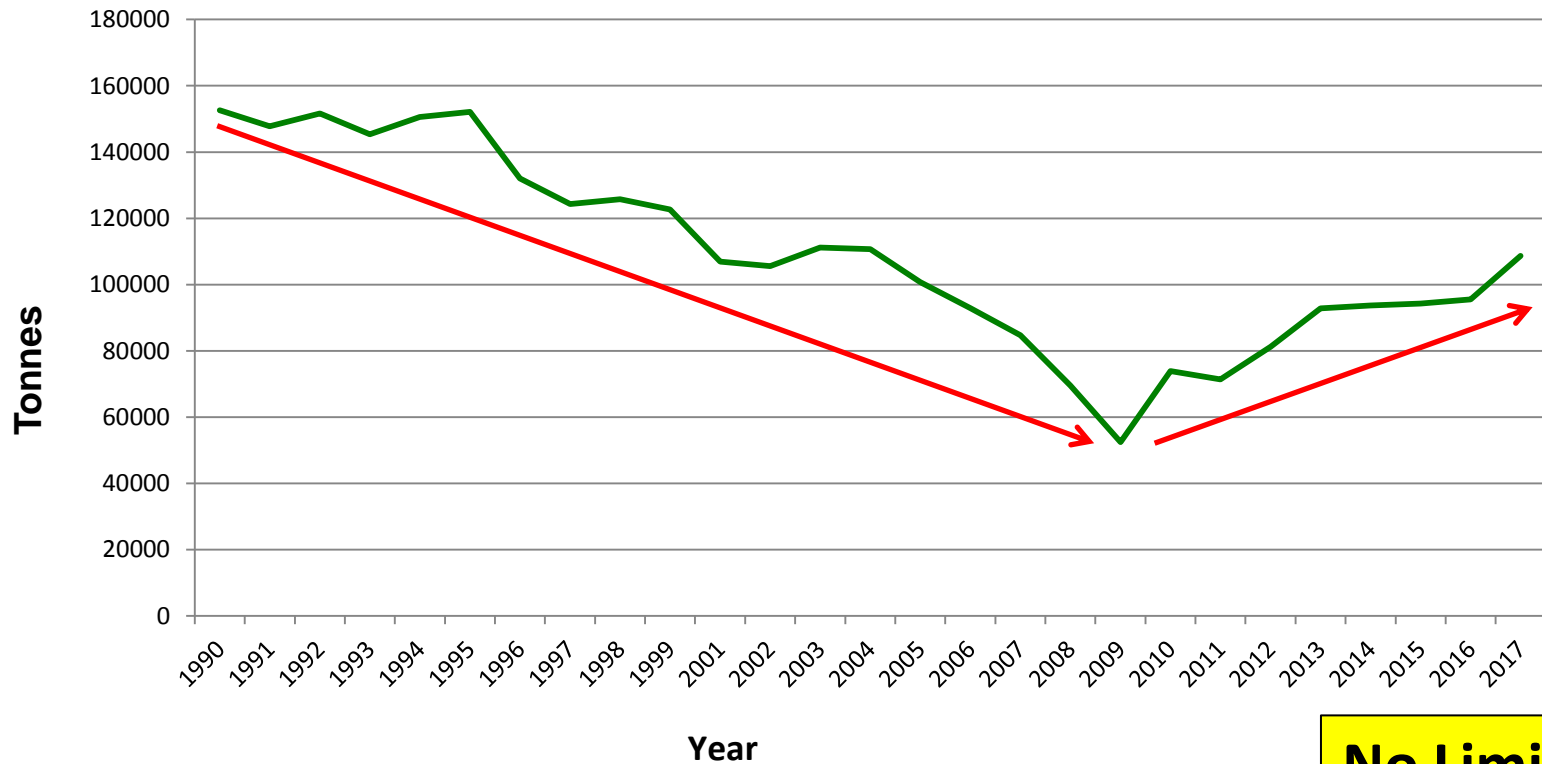
Plunkett, M & Wolf, D.P. 2018

Grass K Requirements

K Requirements of Grazing & Grass Silage Crops

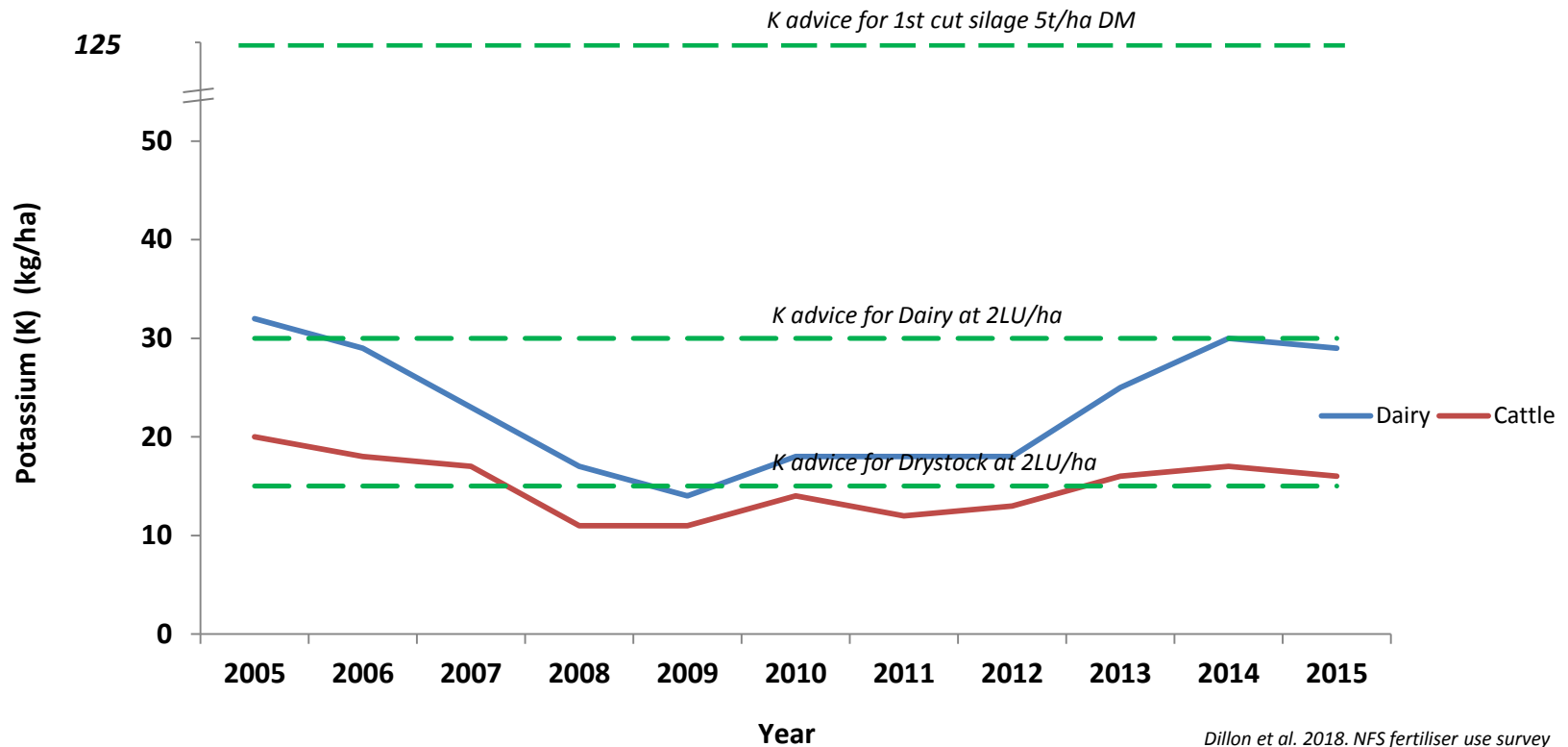


Fertiliser K Sales 1990 to 2017



No Limits on K Fertilisers !!

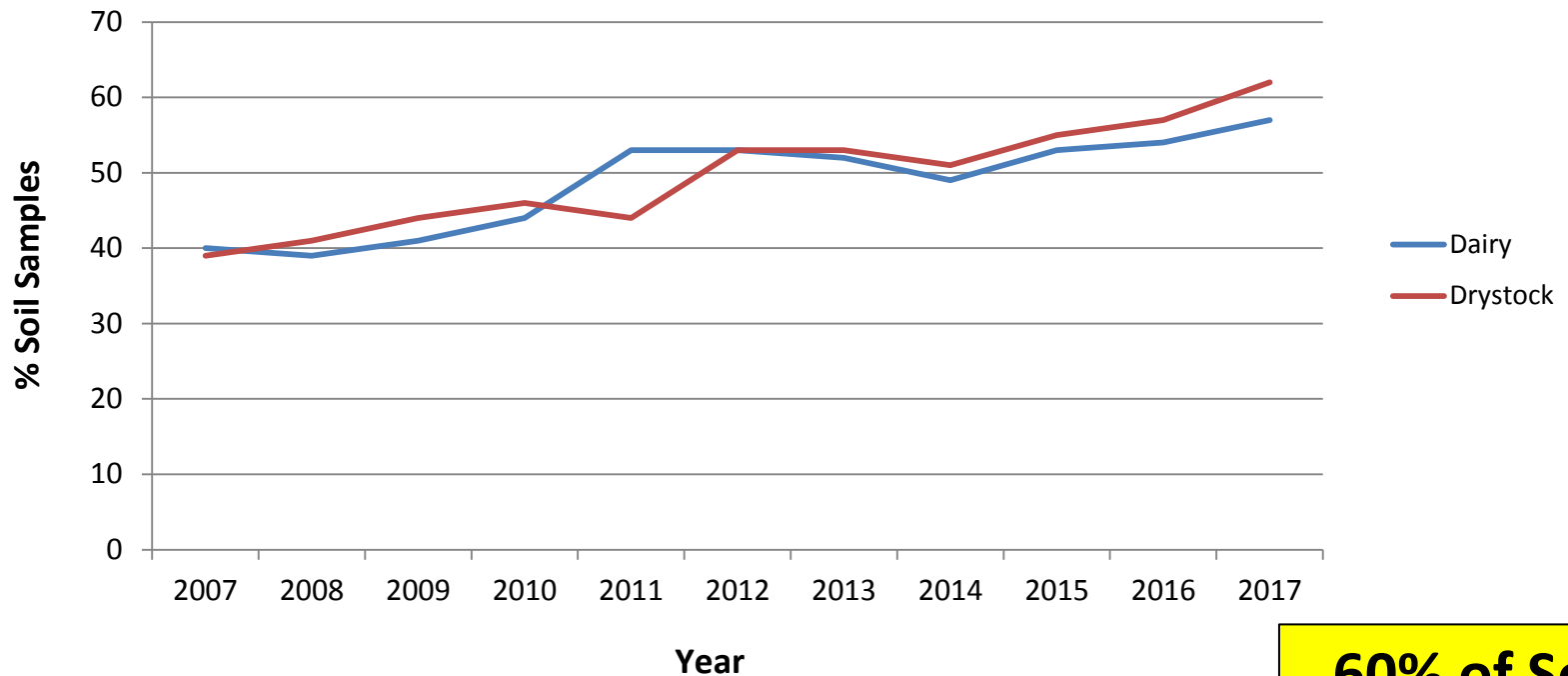
Fertiliser K Use on Grassland Farms



Dillon et al. 2018. NFS fertiliser use survey

Soil Fertility K Trends over last 10 years

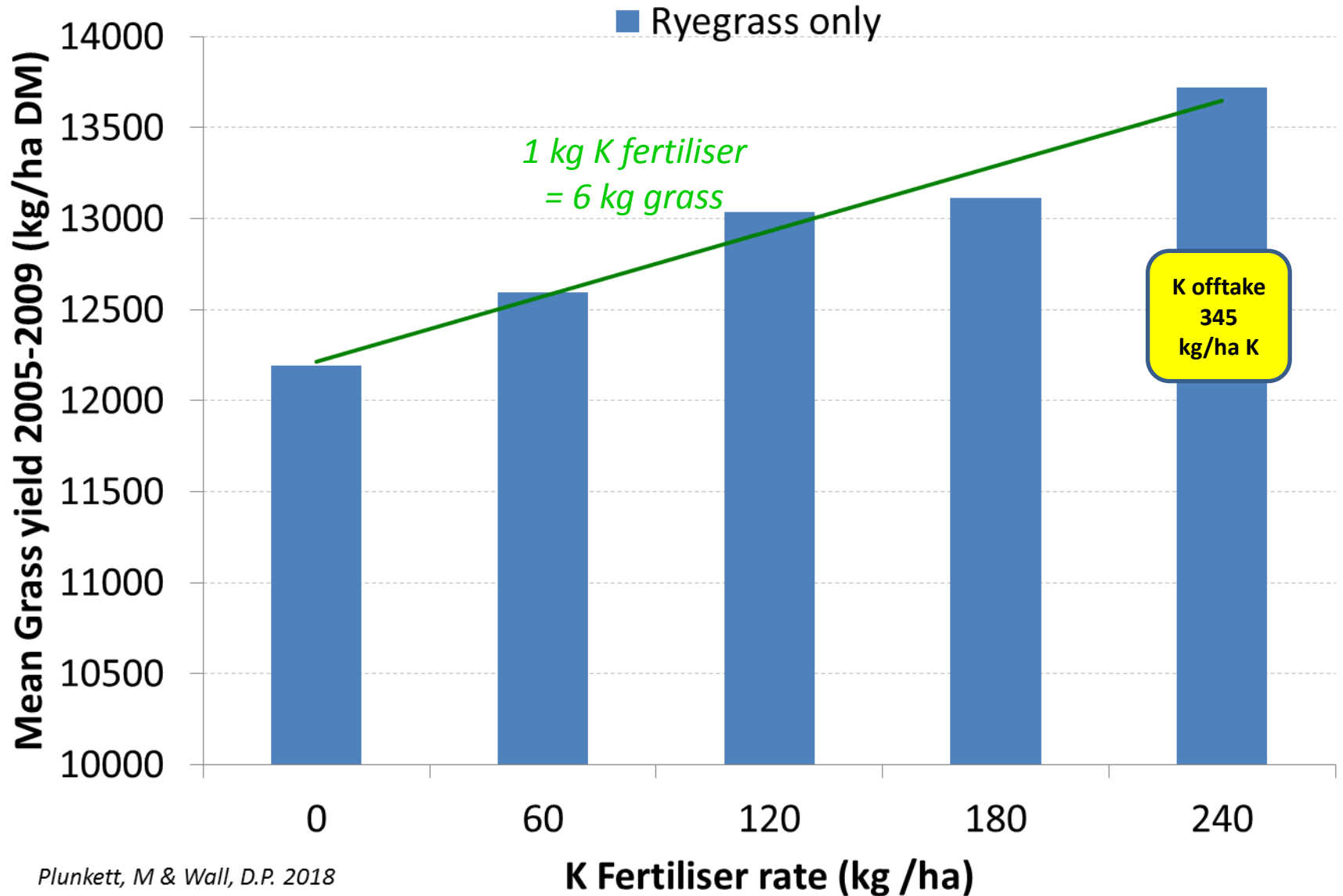
Percentage of Grassland Soil Samples on Dairy & Drystock Farms at Soil K Index 1 & 2



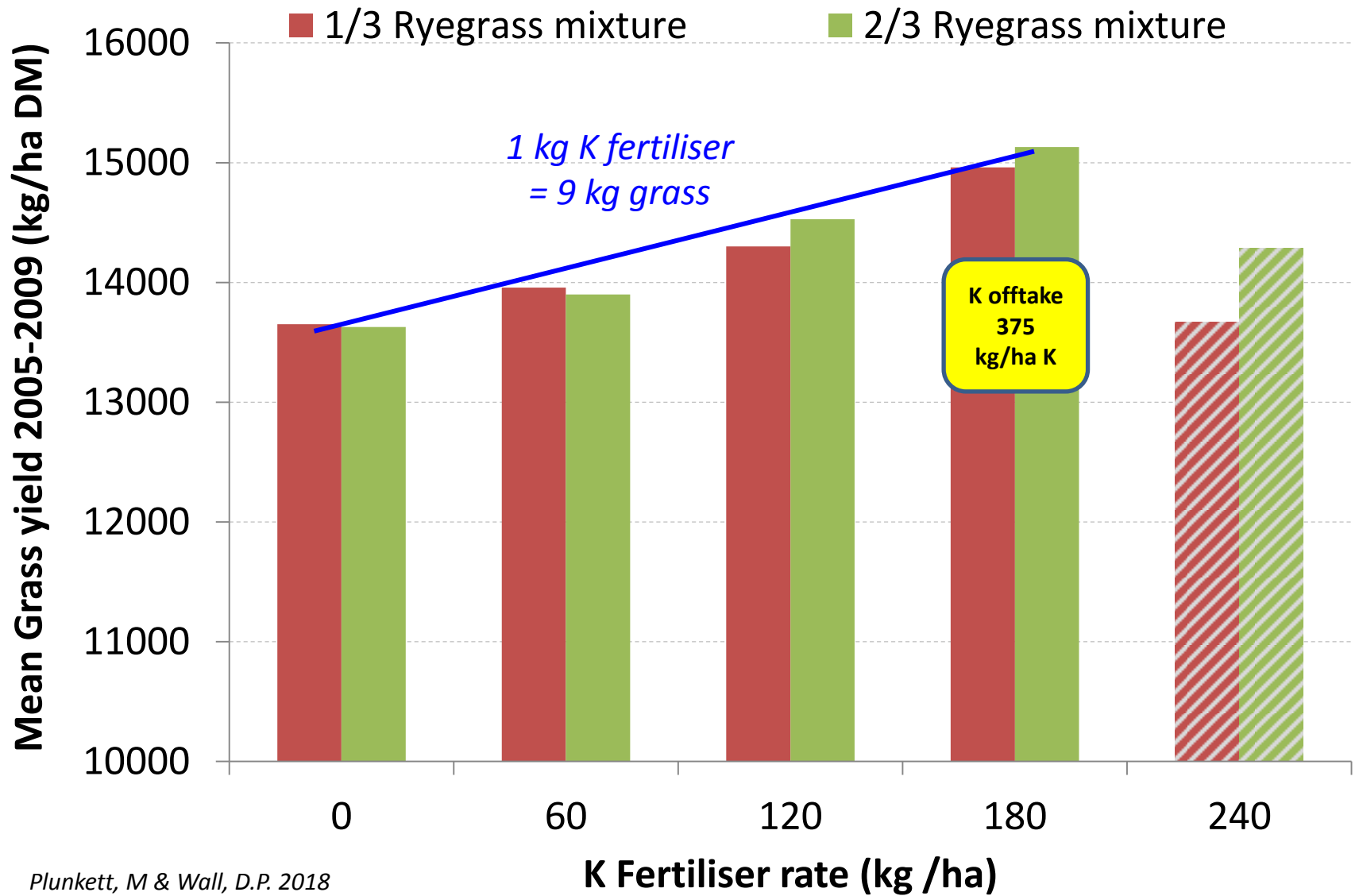
Source:- Teagasc Data Base

**60% of Soils
Deficient in K**

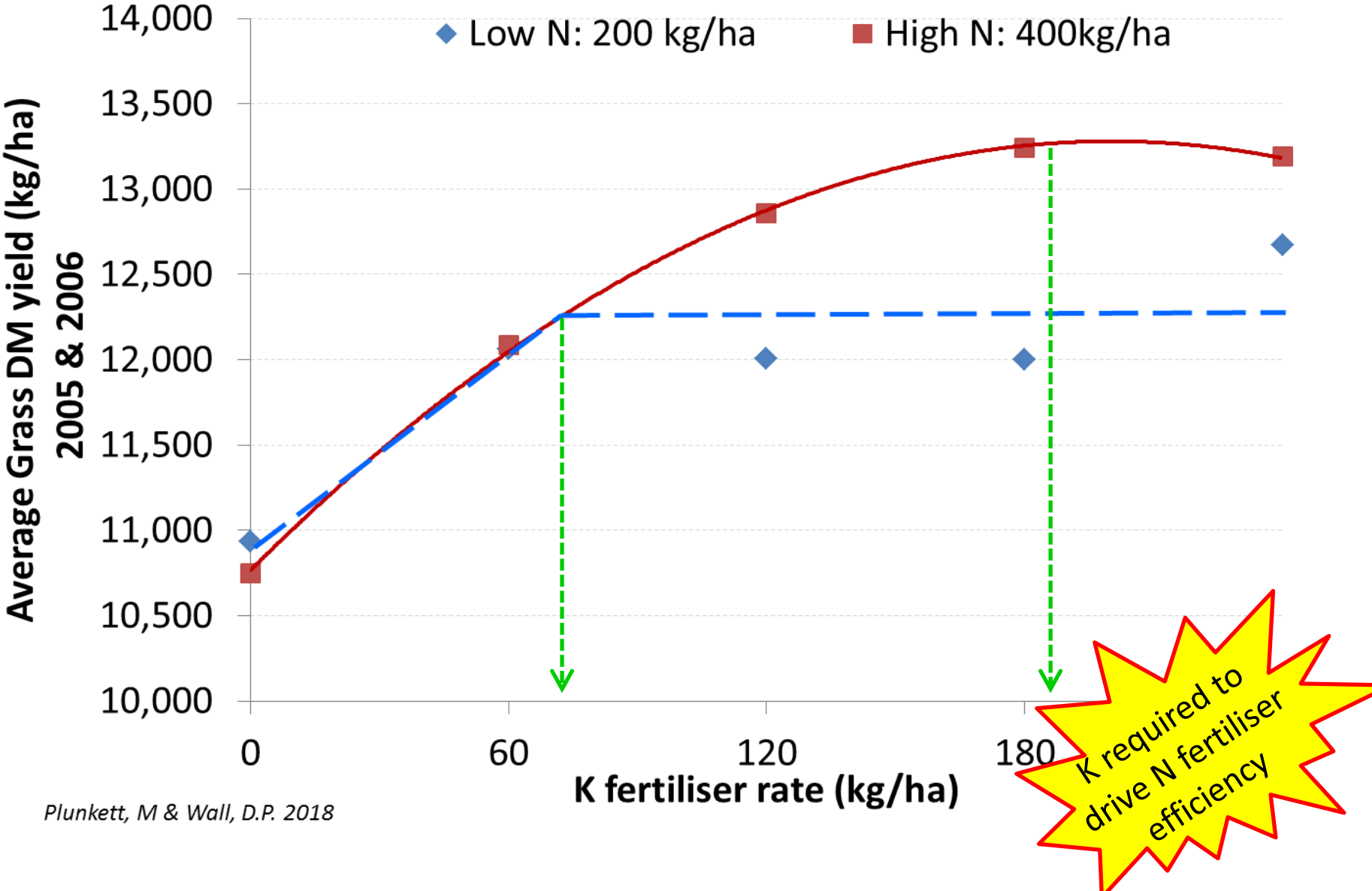
K fertiliser response in ryegrass swards



K fertiliser response in mixed grassland swards



Importance of K when using high N fertiliser rates



Plunkett, M & Wall, D.P. 2018

Fertiliser Advice for Grass Silage Crops

Recommended rates of K for 1 st , 2 nd & 3 rd cut grass silage				
Soil Index	1 st Cut <i>5 t/ha DM</i>	2 nd Cut <i>3 t/ha DM</i>	3 rd Cut <i>2 t/ha DM</i>	Total K <i>kg/ha</i> <i>(units/ac)</i>
1	185			
2	155			
3	125			
4	0			
<p><i>On Index 4 soils omit K for one year and revert back to Index 3 advice until next soil test.</i></p> <p><i>Adjust K advice by +/- 25kg K/ha per tonne of grass DM.</i></p>				



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1	185	75	50	
2	155	75	50	
3	125	75	50	
4	0	0	0	

*On Index 4 soils omit K for one year and revert back to Index 3 advice until next soil test.
Adjust K advice by +/- 25kg K/ha per tonne of grass DM.*



Fertiliser Advice for Grass Silage Crops

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1	185	75	50	310 (248)
2	155	75	50	280 (224)
3	125	75	50	250 (200)
4	0	0	0	0
<p><i>On Index 4 soils omit K for one year and revert back to Index 3 advice until next soil test. Adjust K advice by +/- 25kg K/ha per tonne of grass DM.</i></p>				



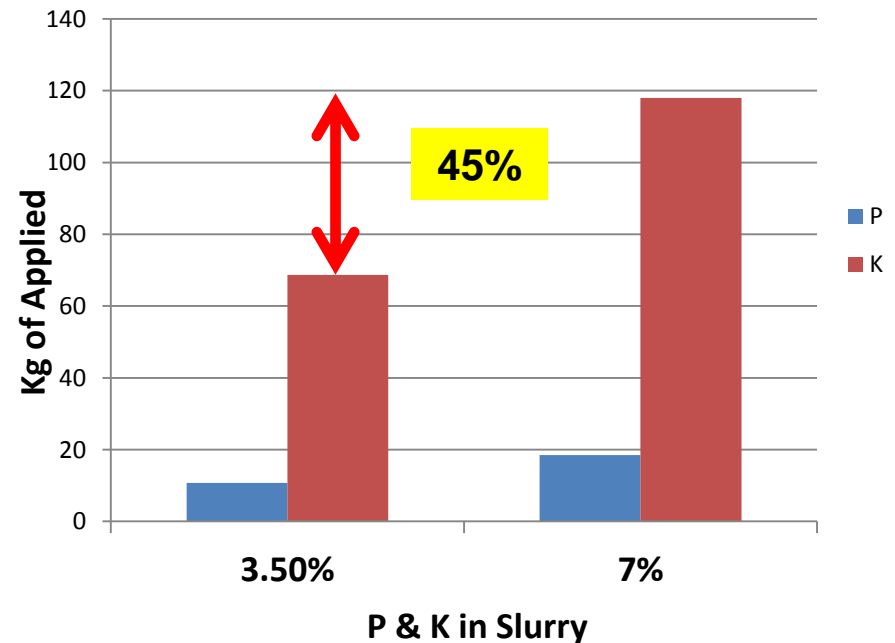
K Sources for Grass Silage Crops

Cattle Slurry

- Recycle cattle slurry on silage fields
- Replenish soil K levels
- Correct P : K Ratio
- DM % large effect on P & K values



P & K supplied in 33m³/ha of cattle slurry and impact of slurry DM%



- Test slurry & check nutrient values
- Adjust applications based on DM

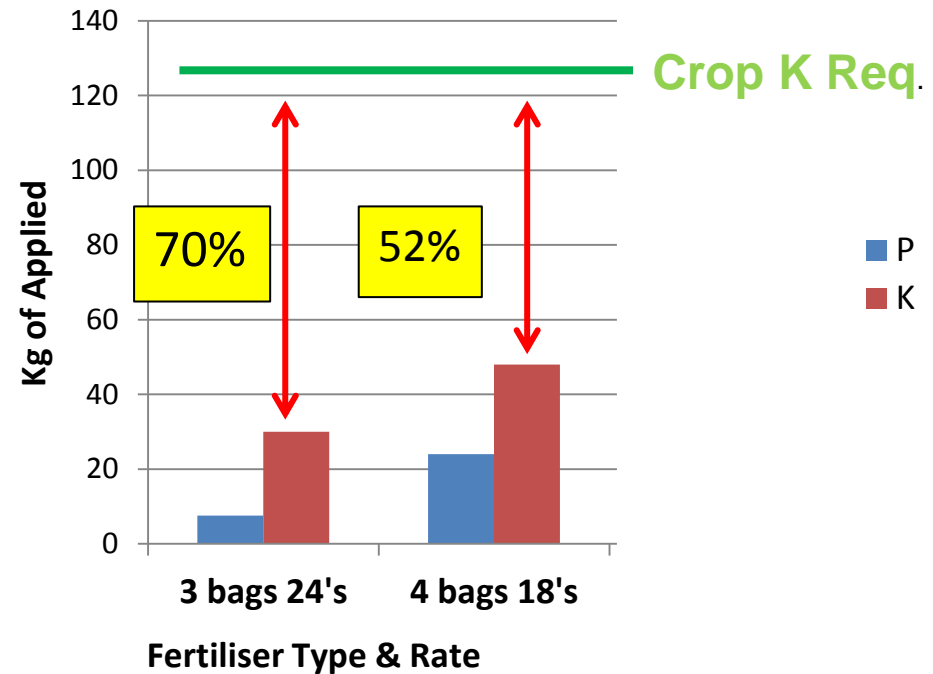
K Sources for Grass Silage Crops

Fertilisers

- 24-2.5-10 (3 bags/ac)
- 18-6-12 (4 bags/ac)

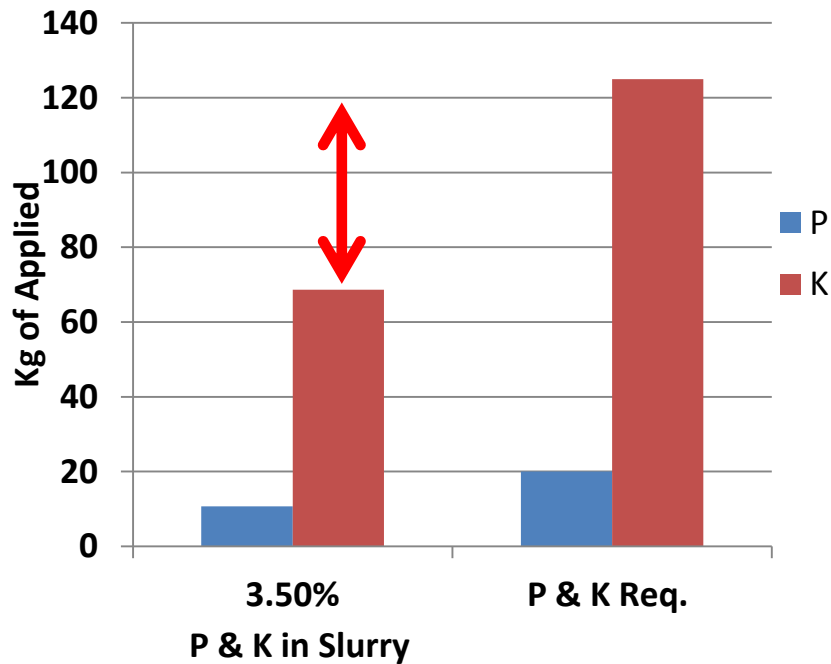


Fertiliser Type and P & K applied at typical application rates



Fertilisers with a Low DM Slurry (4%)

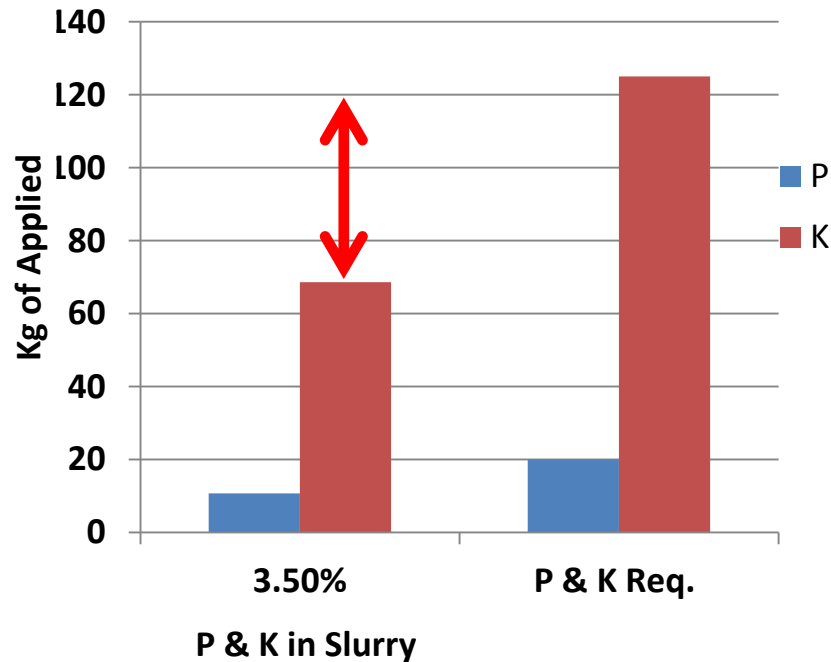
P & K supplied in 33m³/ha of cattle slurry and Crop Requirements



Maintenance
Fertiliser Programme - Index 3
2 bags/ac 15-3-20

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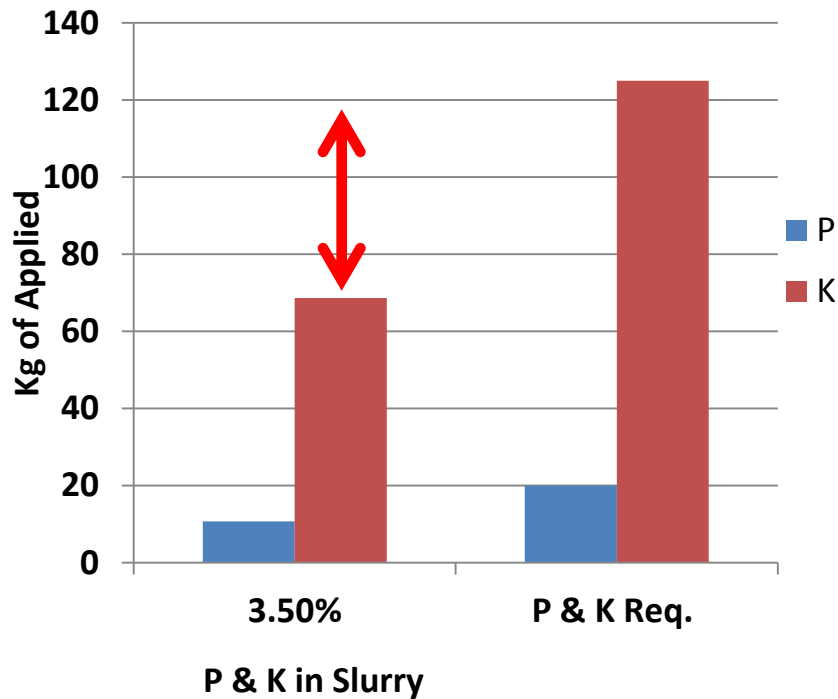
P & K supplied in 33m³/ha of cattle slurry and Crop Requirements



Maintenance
Fertiliser Programme - Index 3
2 bags/ac 15-3-20
+ Build Up
Fertiliser Programme - Index 2
1 bags/ac 0-10-20

Fertilisers with a Low DM Slurry (4%)

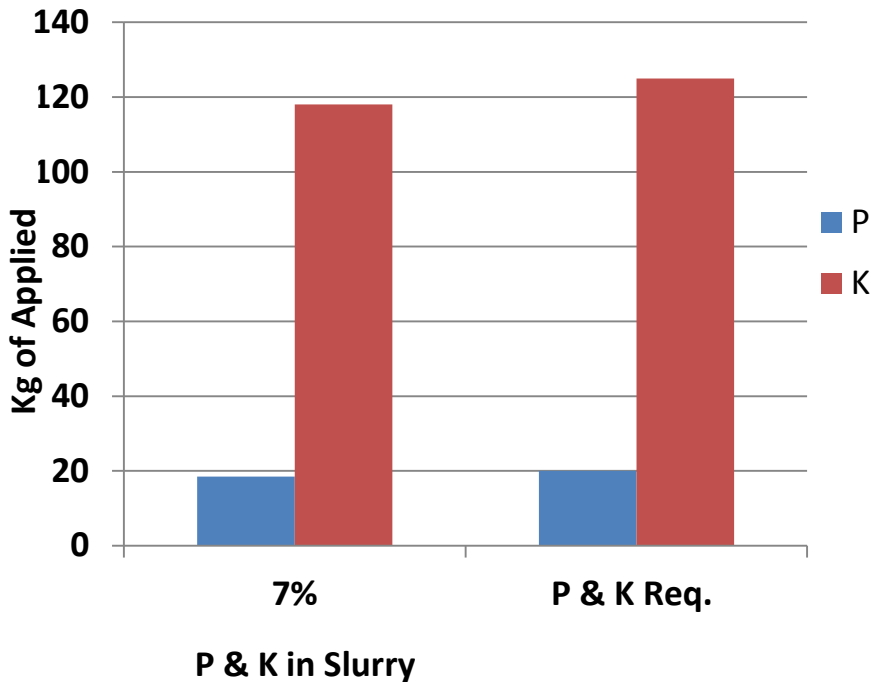
P & K supplied in 33m³/ha of cattle slurry and Crop Requirements



Maintenance
Fertiliser Programme - Index 3
2 bags/ac 15-3-20
+ Build Up
Fertiliser Programme - Index 2
1 bags/ac 0-10-20
+ Build Up
Fertiliser Programme - Index 1
2 bags/ac 0-10-20

Fertilisers with a High DM Slurry (8%)

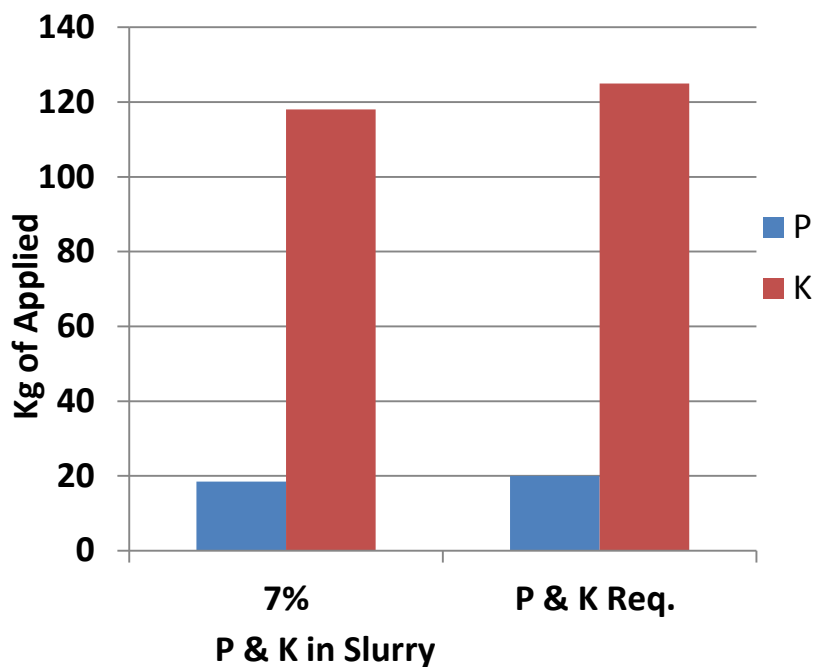
P & K supplied in 33m³/ha of cattle slurry and Crop Requirements



Maintenance
Fertiliser Programme - Index 3
Straight N or 27's / 24's

Fertilisers with a High DM Slurry (8%)

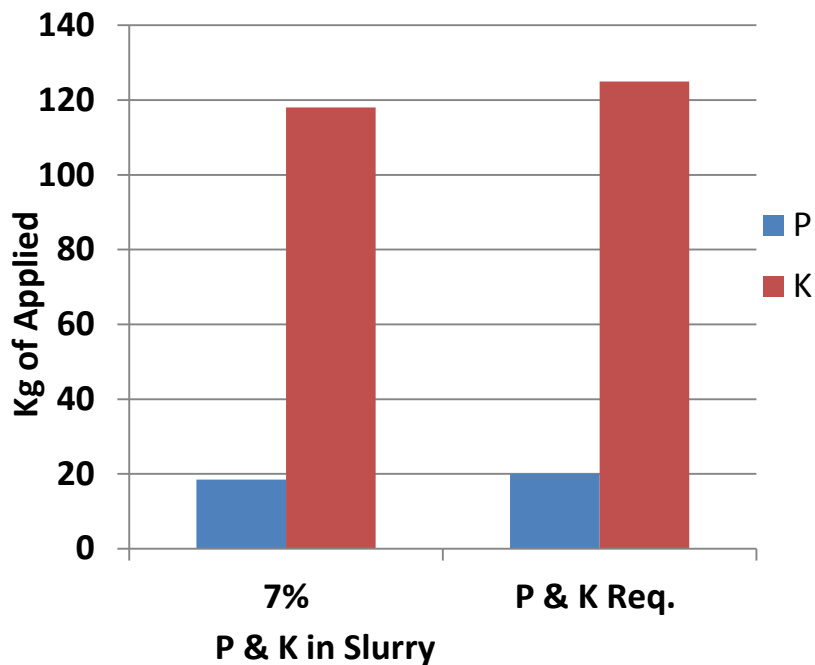
P & K supplied in 33m³/ha of cattle slurry and Crop Requirements



Maintenance
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Straight N or 27's / 24's
+ Build Up
Fertiliser Programme - Index 2
1 bags/ac 0-10-20

Fertilisers with a High DM Slurry (8%)

P & K supplied in 33m³/ha of cattle slurry and Crop Requirements



Maintenance
Fertiliser Programme - Index 3
Straight N or 27's / 24's
+ Build Up
Fertiliser Programme - Index 2
1 bags/ac 0-10-20
+ Build Up
Fertiliser Programme - Index 1
2 bags/ac 0-10-20

Fertiliser Requirements without Slurry



Maintenance
K Index 3
2.5 bags/ac 0-7-30

Fertiliser Requirements without Slurry



Maintenance
K Index 3
2.5 bags/ac 0-7-30
+ Build Up
K Index 2
1.0 bags/ac 0-7-30

Fertiliser Requirements without Slurry



Maintenance
K Index 3
2.5 bags/ac 0-7-30
+ Build Up
K Index 2
1.0 bags/ac 0-7-30
+ Build Up
K Index 1
2.0 bags/ac 0-7-30

1 bags/ac of 50% K Req. every 2 years to balance K off-takes

Timings of Fertiliser K

Maintenance	Timing
K Index 3	Early Spring Application
2.5 bags/ac 0-7-30	
+ Build Up	
K Index 2	After 1st Cut Silage
1.0 bags/ac 0-7-30	
+ Build Up	
K Index 1	After 1st Cut Silage
2.0 bags/ac 0-7-30	



**Max. K In
Spring
90kg/ha**

In Summary

- Grass silage crops have a high K demand
- Plan K applications to fulfil crop K requirements
- Recycle all cattle slurry on silage area
- Test Slurry & adjust app. rates appropriately
- Select a suitable fertiliser blend (*High P / K rather than High N fertiliser compounds!!!*)

