Fertilizer use on the commercial dairy farms

James Humphreys, Eimear Ruane, Andy Boland and Donal O'Brien

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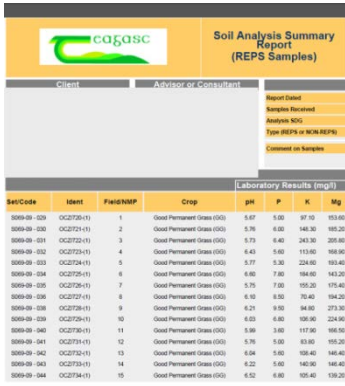
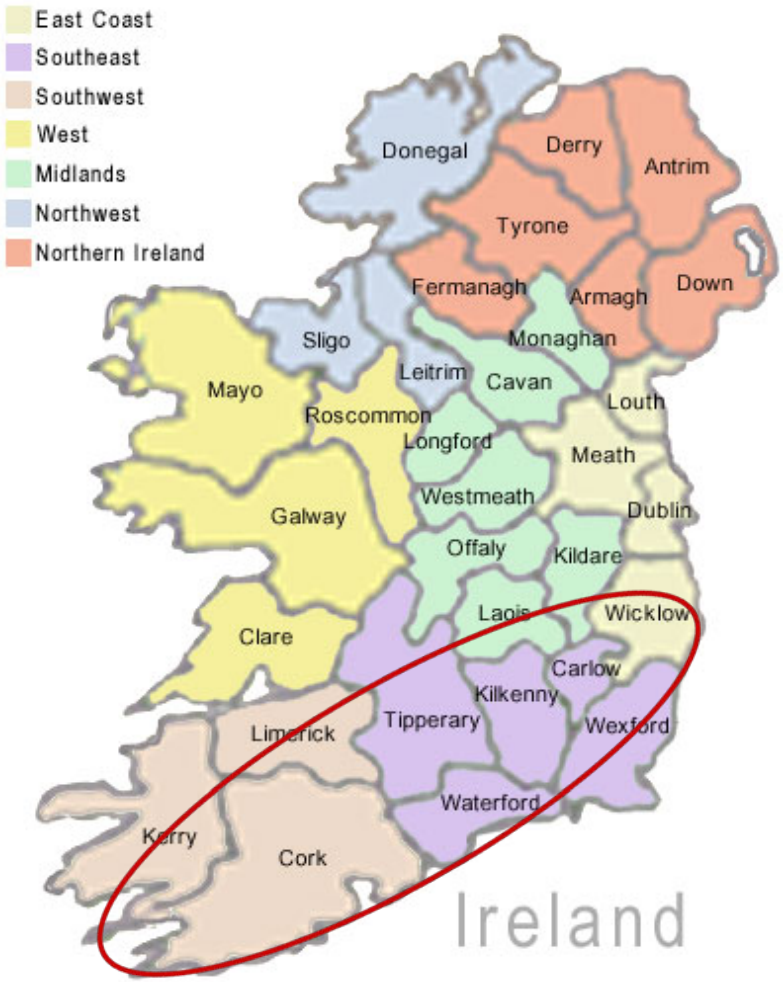


Characteristics of 50 dairy farms



Average farm size:	66 ha
Average no. dairy cows:	98
Average milk sales:	525,000 litres
Milk solids per farm:	40,500 kg
Milk solids per cow:	415 kg
Concentrates fed:	645 kg/LU
Fertilizer N use:	230 kg/ha
Fertilizer P use:	8 kg/ha
Fertilizer K use:	29 kg/ha

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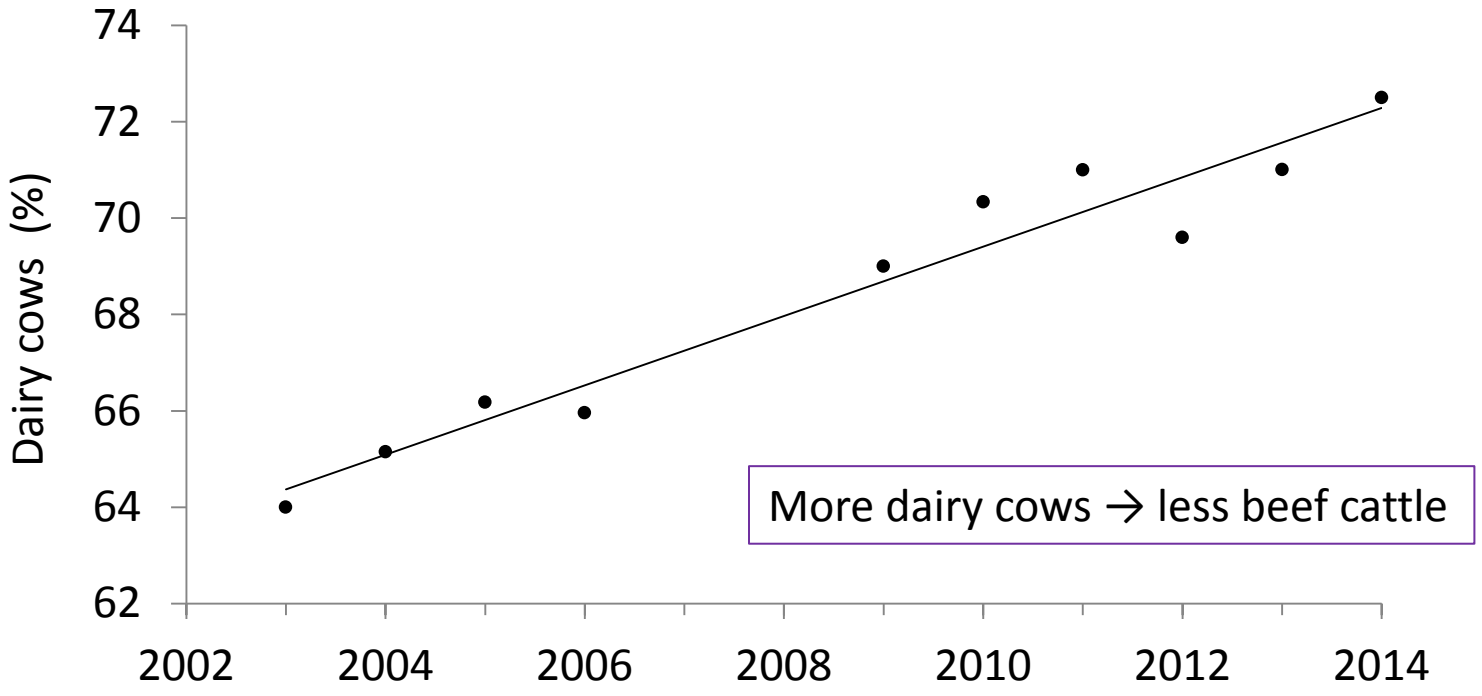
Farm characteristics

	Average	Range
Stocking rate (LU/ha)	2.45	1.62 to 2.89
Grass DM production (t/ha)	8.9	7.5 to 11.5

Dairy cows as a percentage of total livestock on farms

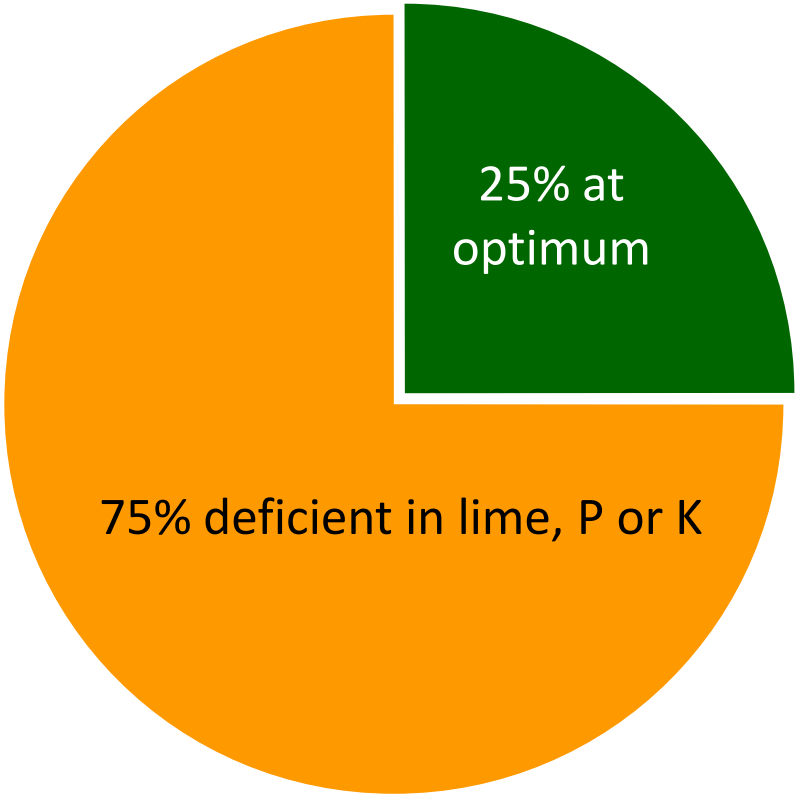


Soil fertility on dairy farms

551 samples – silage and grazing areas

Soil pH greater than 6.0

Index 3 & 4 for soil P and soil K



54% of fields with low soil pH

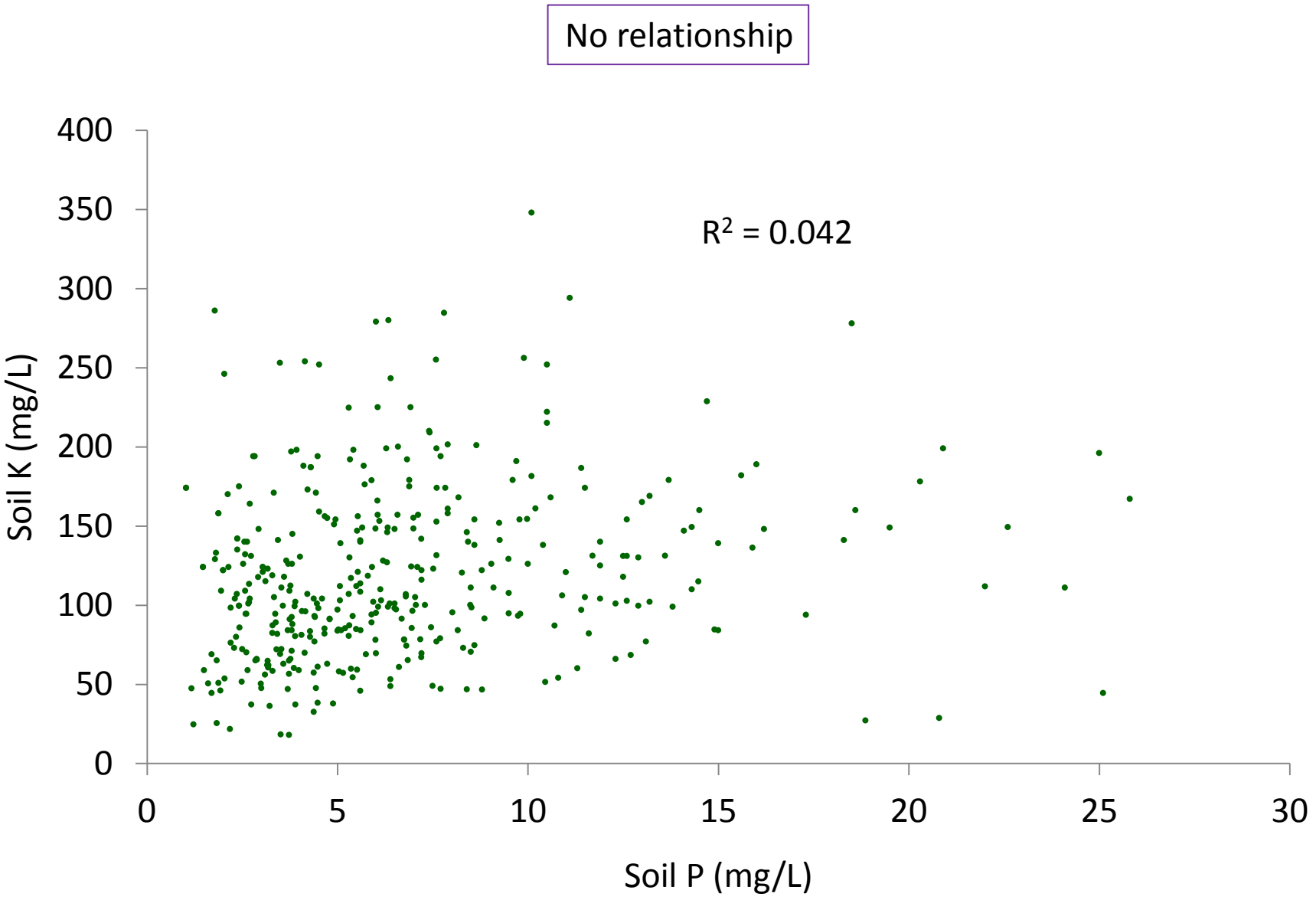
39% of fields with low soil P

39% of fields with low soil K

Fertilizer use

Fertilizer	**N**	**P**	**K**
Actual (kg/ha)	230	8	29
Required (kg/ha)	230	17	70

The relationship between soil P and soil K on farms



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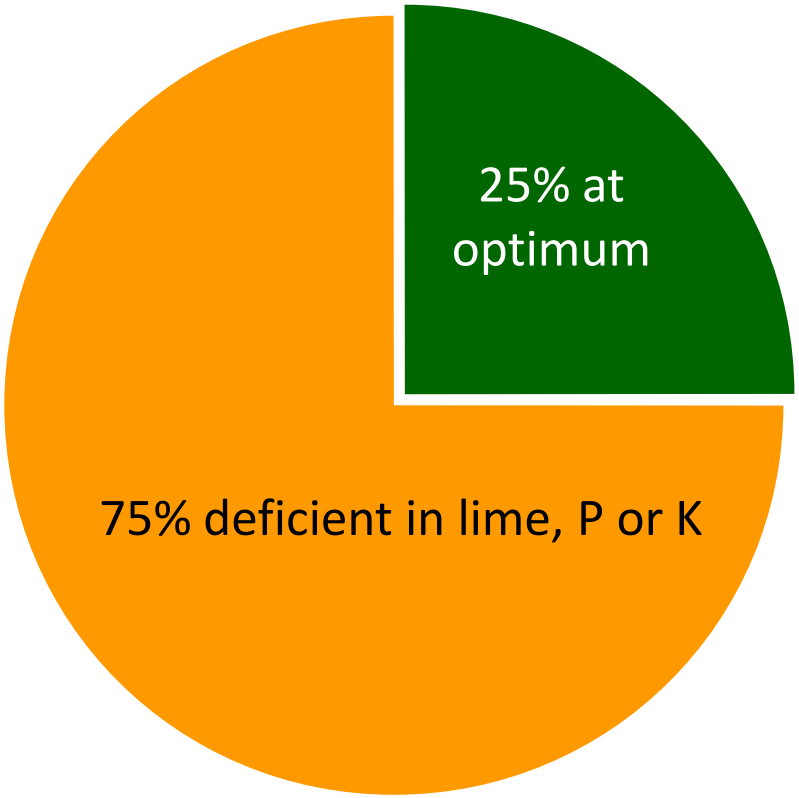

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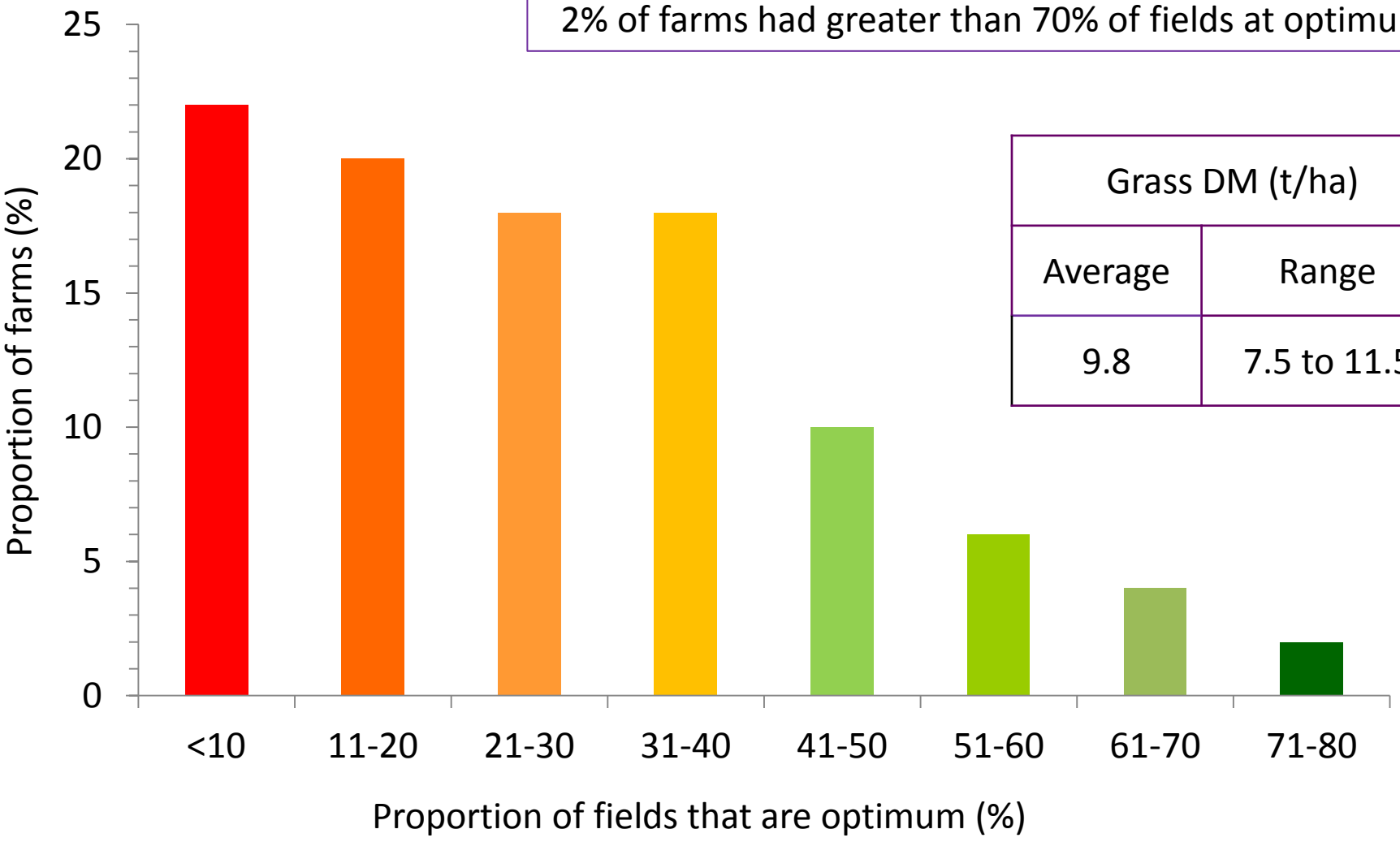
Distribution of soil fertility per farm

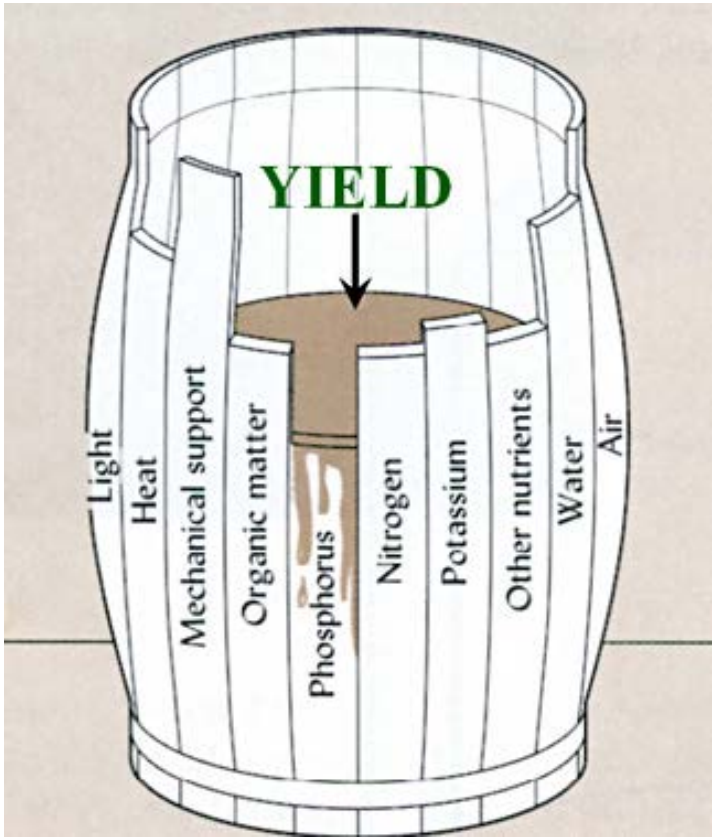
80% of farms had less than 40% of fields at optimum

2% of farms had greater than 70% of fields at optimum

Grass DM (t/ha)	
Average	Range
9.8	7.5 to 11.5



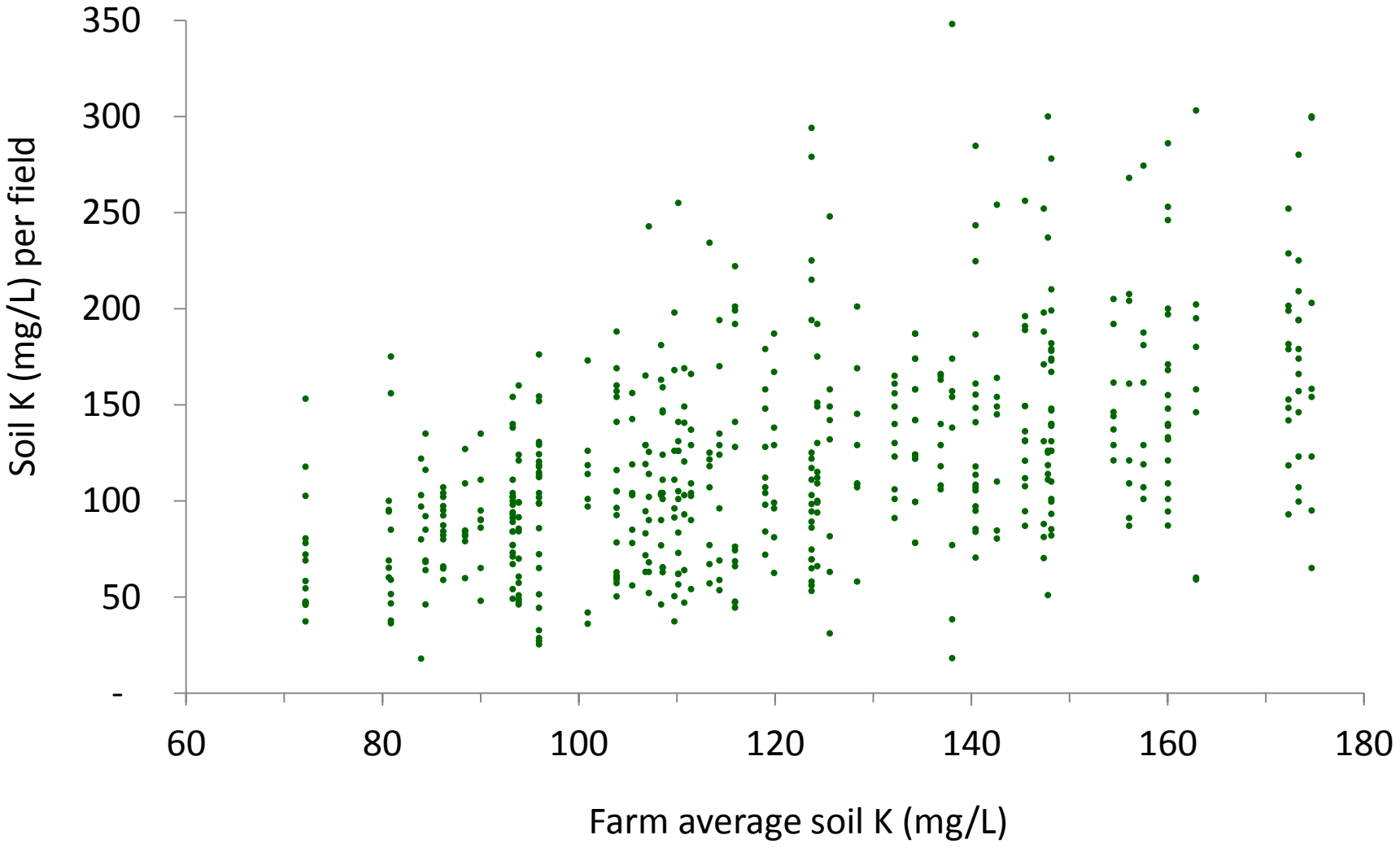
Grass growth is determined by the most limiting nutrient



Need to maximise grass growth through optimum soil fertility

→ Savings on lime, P and K are often a false economy

Soil K in fields plotted against average soil K on each farm



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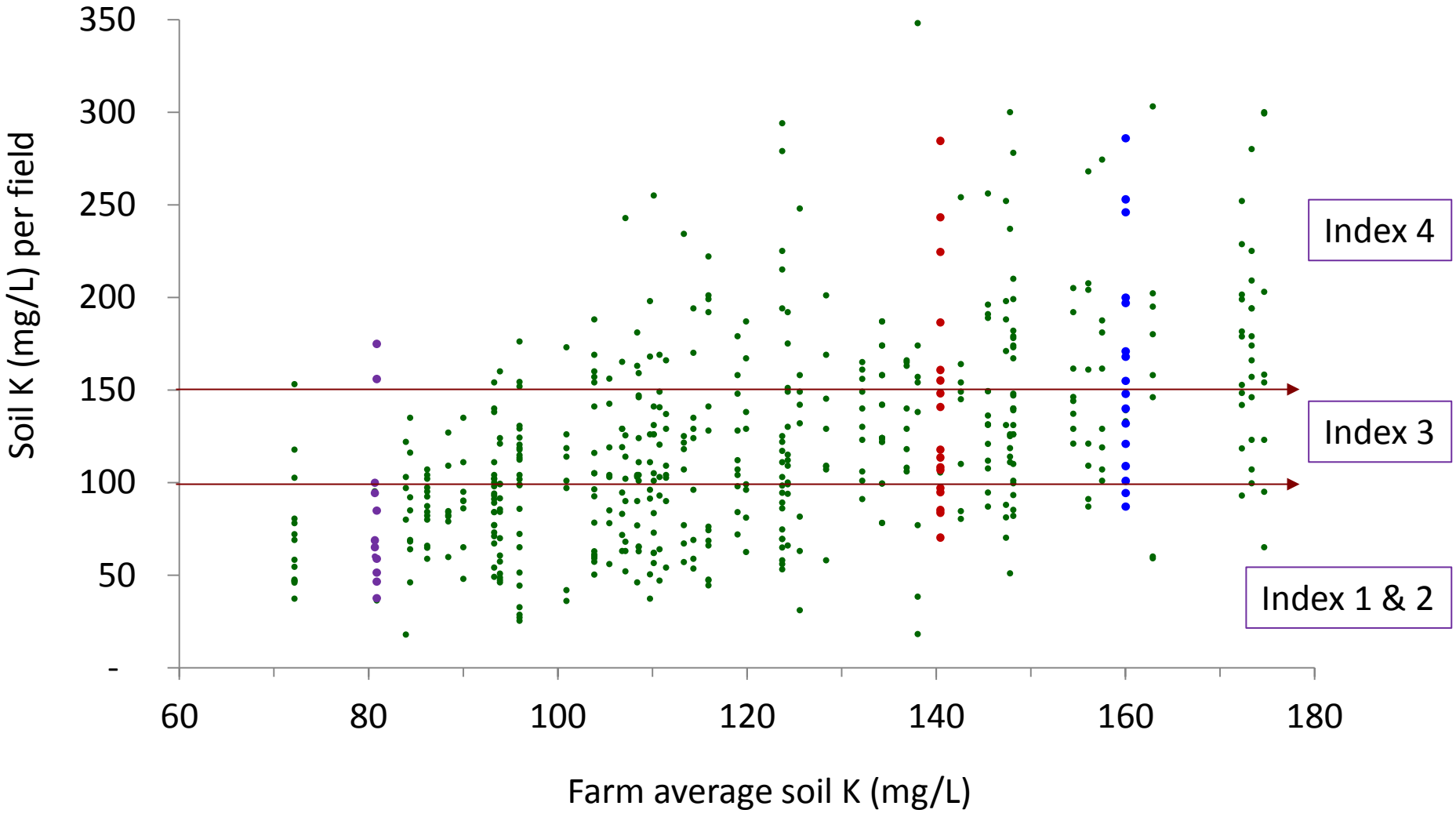


Fertilizer management on farms

Since 2006 dairy farms in the study stopped importing pig slurry

Reduction in fertilizer P and K use – primarily due to costs (false economy)

Very variable levels of engagement with fertilizer planning

→ current requirements are very complicated due to regulations

→ disappointment with the results – particularly with P

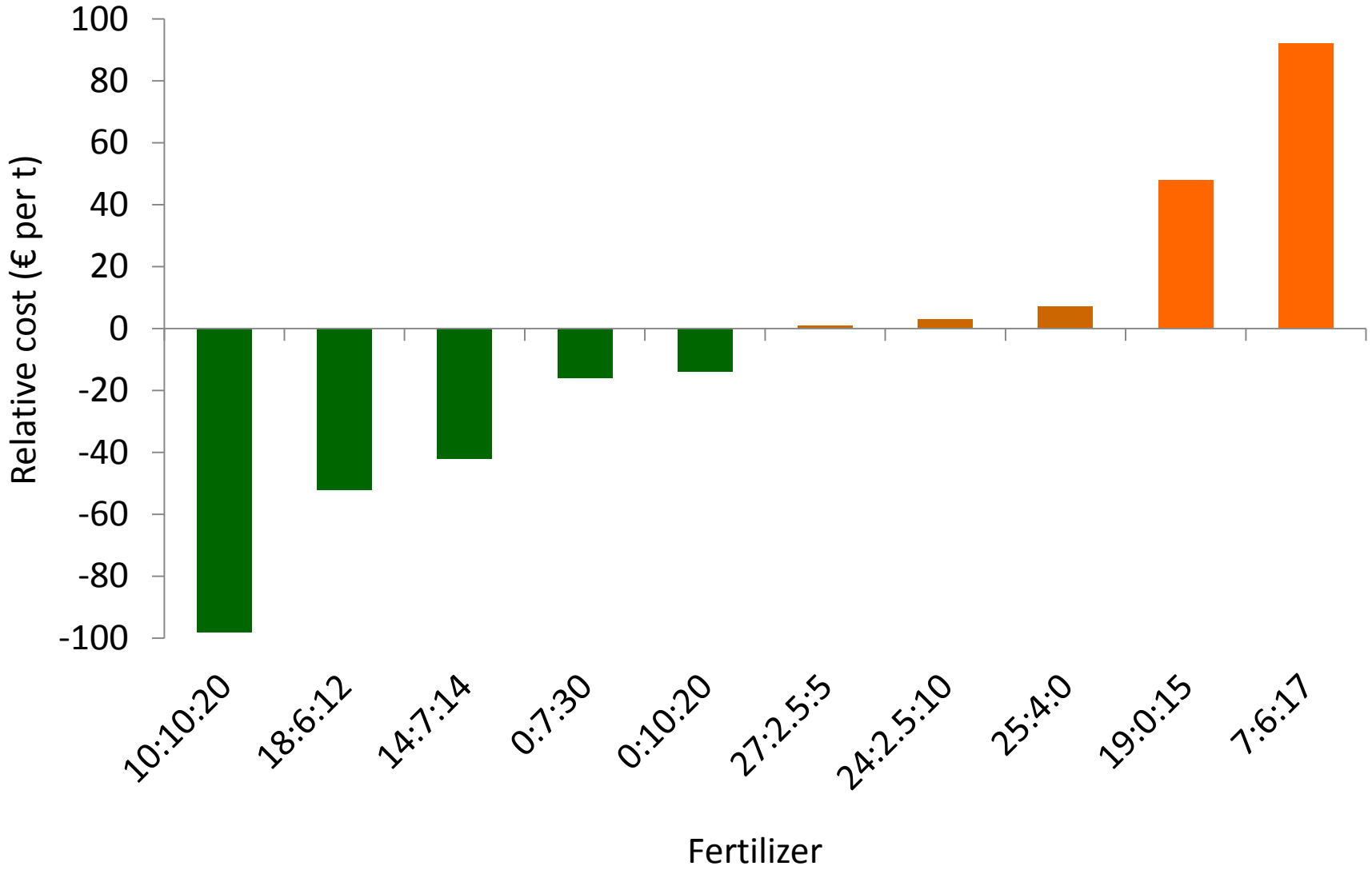
→ some plans exist only to meet regulatory requirements

→ disconnect between drawing up (planner) and implementing the plan (farmer)

→ farmers need to understand and control the plan to get the best outcome

Many farmers are carrying on as they have always done except more focus on fertilizer N

The cost of compound fertilizers relative to straights (CAN, Super P and Muriate of K)



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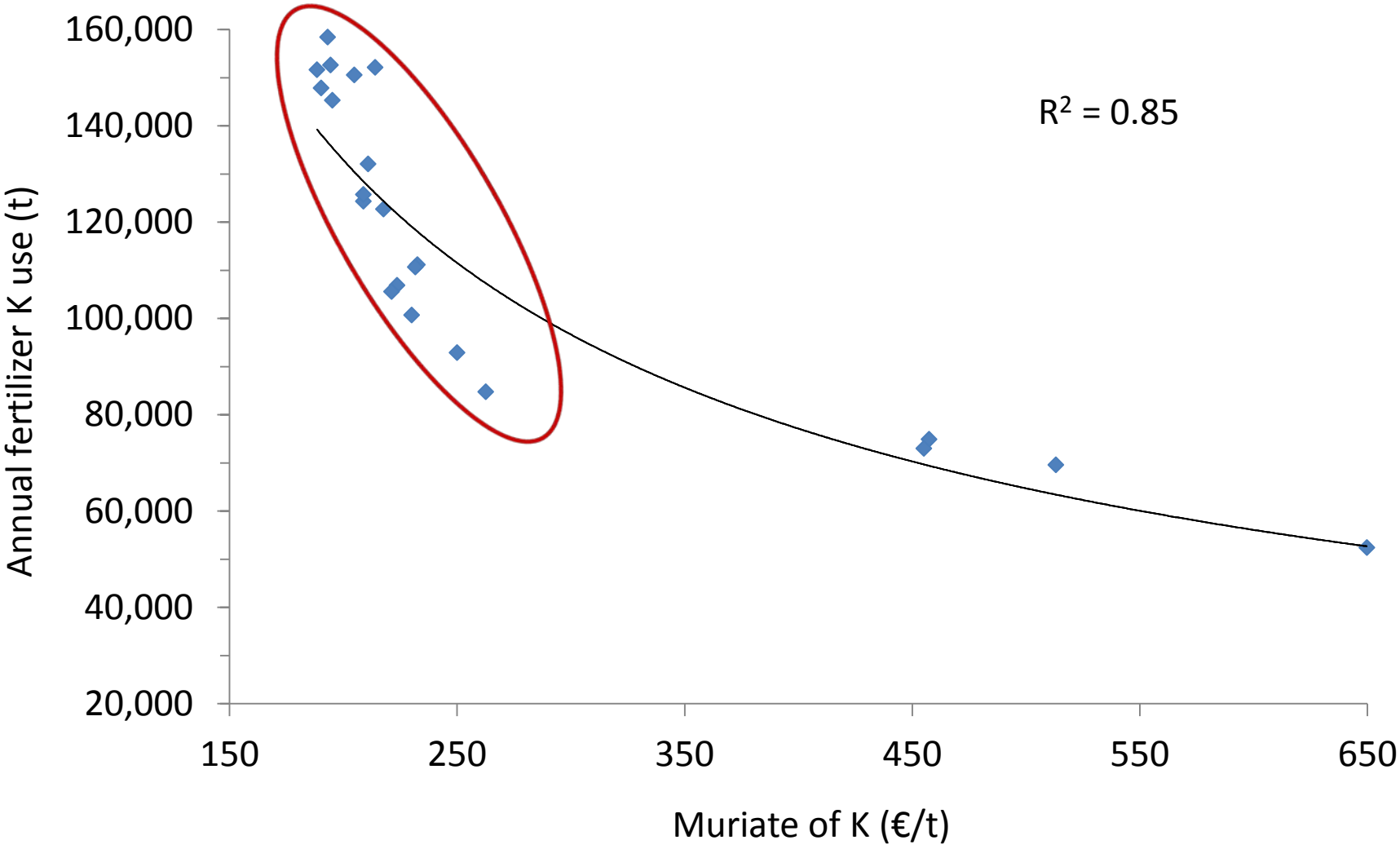
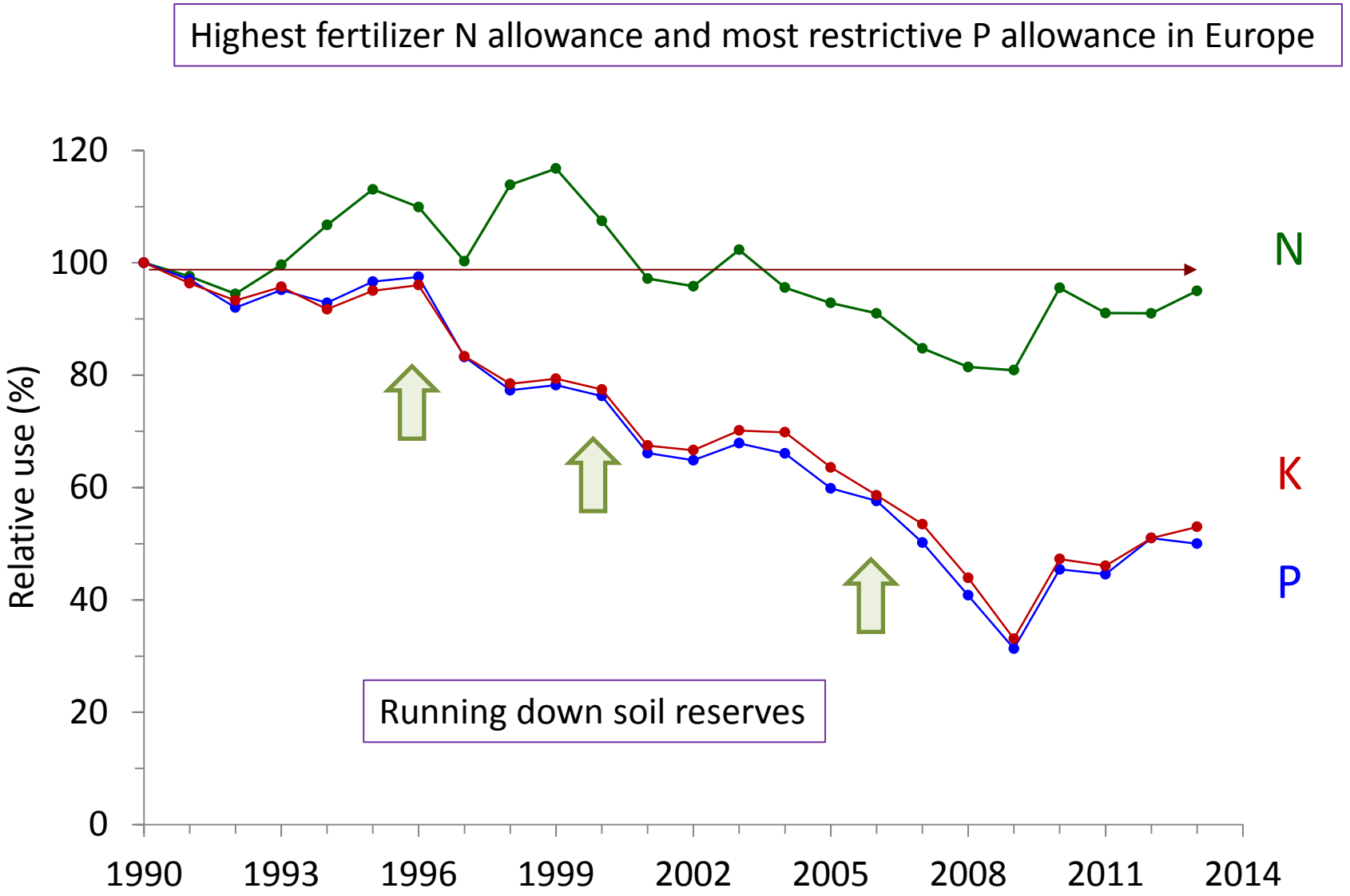
The cost of muriate of potash and annual fertilizer K use



N, P and K use between 1990 and 2011 relative to 1990



Trends in P and K fertilizer use on farms

Fertiliser K use has declined substantially despite no change in the recommendations

Relationship between P recommendations/allowances and use is partly coincidental

Farmers are using far less fertilizer P & K than allowed/recommended

Therefore

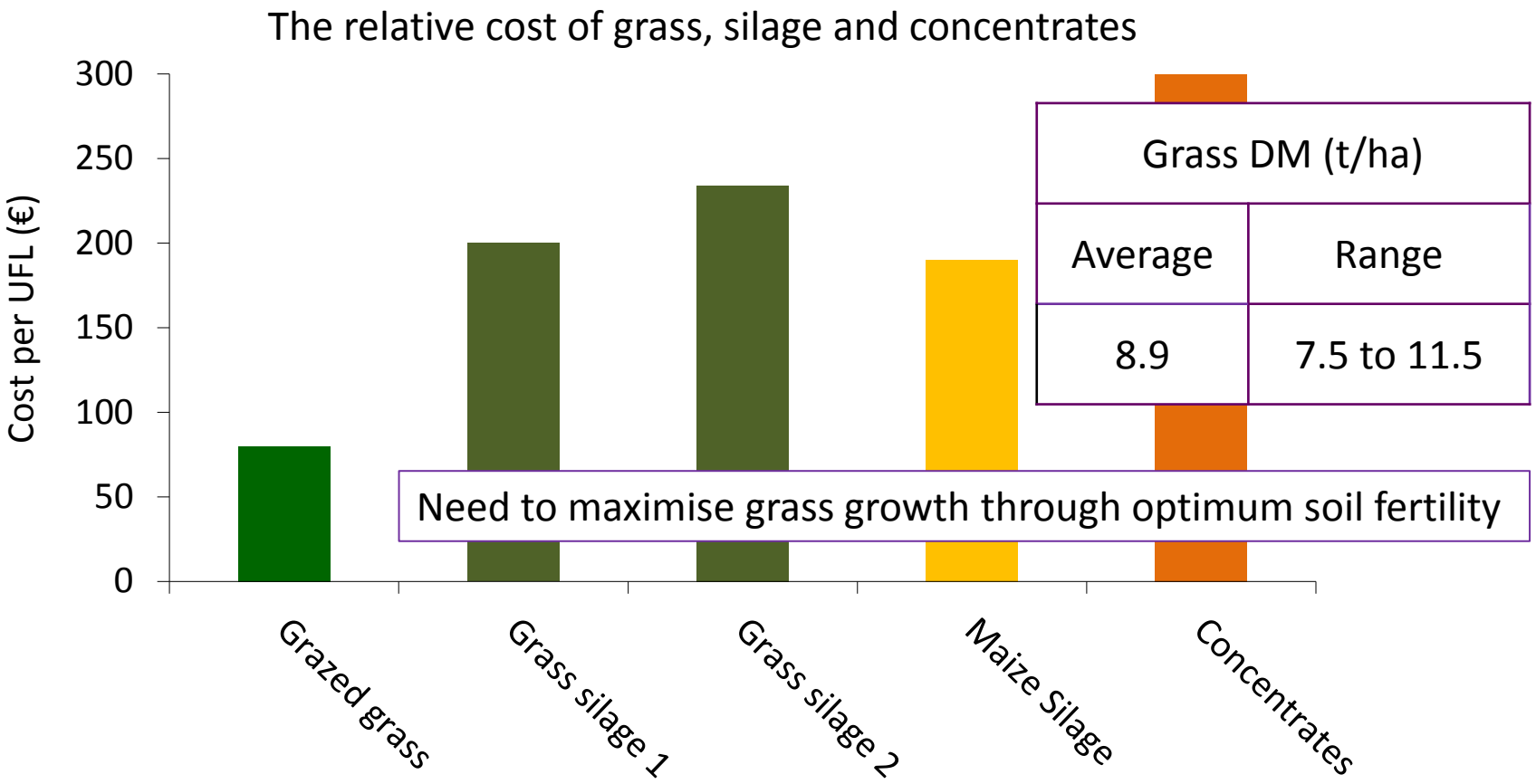
Cost has been the major factor governing fertilizer use and regulation has a lessor role

→ Farmers are more likely to under-use than over-use fertilizer P & K

What farmers want in 2015

To grow 14 t of grass DM per ha per year

"Simplified on-line planner to let us know how much P and K we can use"



Conclusions

Widespread deficiency in lime, P and K on dairy farms

→ running down of soil reserves

→ inefficient use of fertilizer N

K

→ curtailing grass production on farms

Cost is the major disincentive to fertilizer K and P use on farms (false economy)

Fertilizer planning is complicated → this is compounded by the regulations

We know how to optimise soil fertility → the problem is at the implementation stage

Very variable levels of farmer engagement with fertilizer planning

The key is for farmers to understand and control the plan

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Recommendations

Need farmer engagement with fertilizer planning to get the best outcome

Need a simplified planner that works on a per-field basis

→ adjust regulations to accommodate this

Farmers are more likely to under-use than over-use fertilizers (cost sensitive)

P and K use is self-correcting when accompanied by soil testing

Get soils tested and make use of results → identify fields with deficiencies

→ calculate lime and fertilizer requirements

Improving soil pH is the first step → Ground limestone

Identify fields low in K and recycle slurry to these fields

Compounds or straights (muriate of potash) to balance the remainder

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