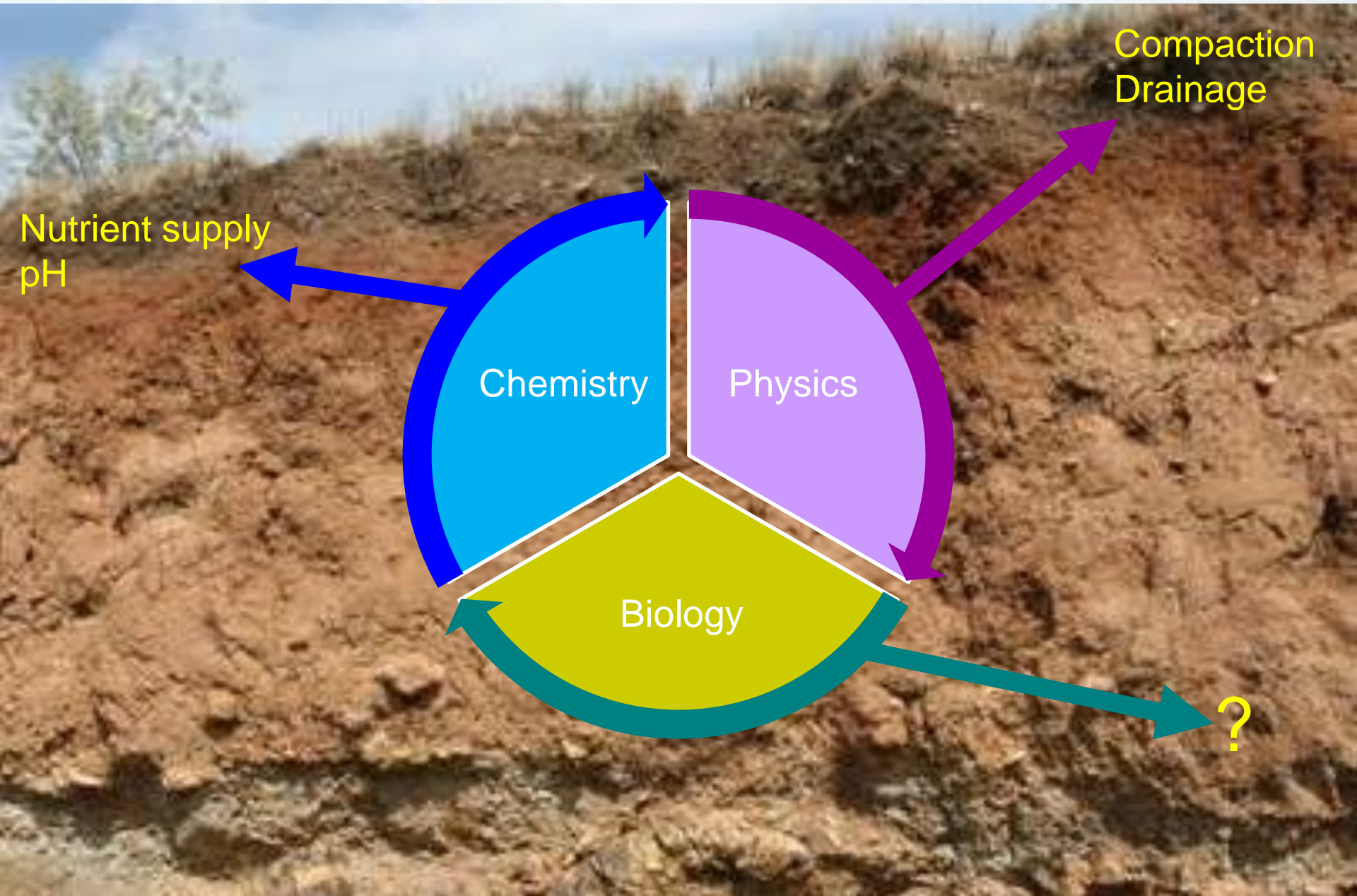


Cereals, organic materials and soil (COMS) project

Ethel White, AFBI Crossnacreevy,
John Bailey, Donnacha Doody and
Archie Murchie, AFBI Newforge

Soil – its complexity



Compaction
Drainage

Nutrient supply
pH

Chemistry

Physics

Biology

?

Soil formation

c.500 years to produce 1 cm soil

Bacteria and fungi need feeding

BUT we remove everything

Applying organic manures = investment,
i.e. return is realised in the long term

£££

Soil – a bank?!

££££££

t - i - m - e



Application of the organic materials using the SlurryKat plot slurry application system



Organic manures

```
graph TD; A[Organic manures] --> B[Soil fauna and microbiome]; B --> C[Nutrient availability]; B --> D[Infiltration and workability]
```

The background image shows a tractor with a tillage implement, possibly a moldboard plow or a similar device, working in a green field. The tractor is moving away from the viewer, leaving a path of disturbed soil. The field is lush green, and the sky is filled with large, white clouds. In the distance, there are rolling hills, a few houses, and a tall electricity pylon.

Soil fauna and
microbiome

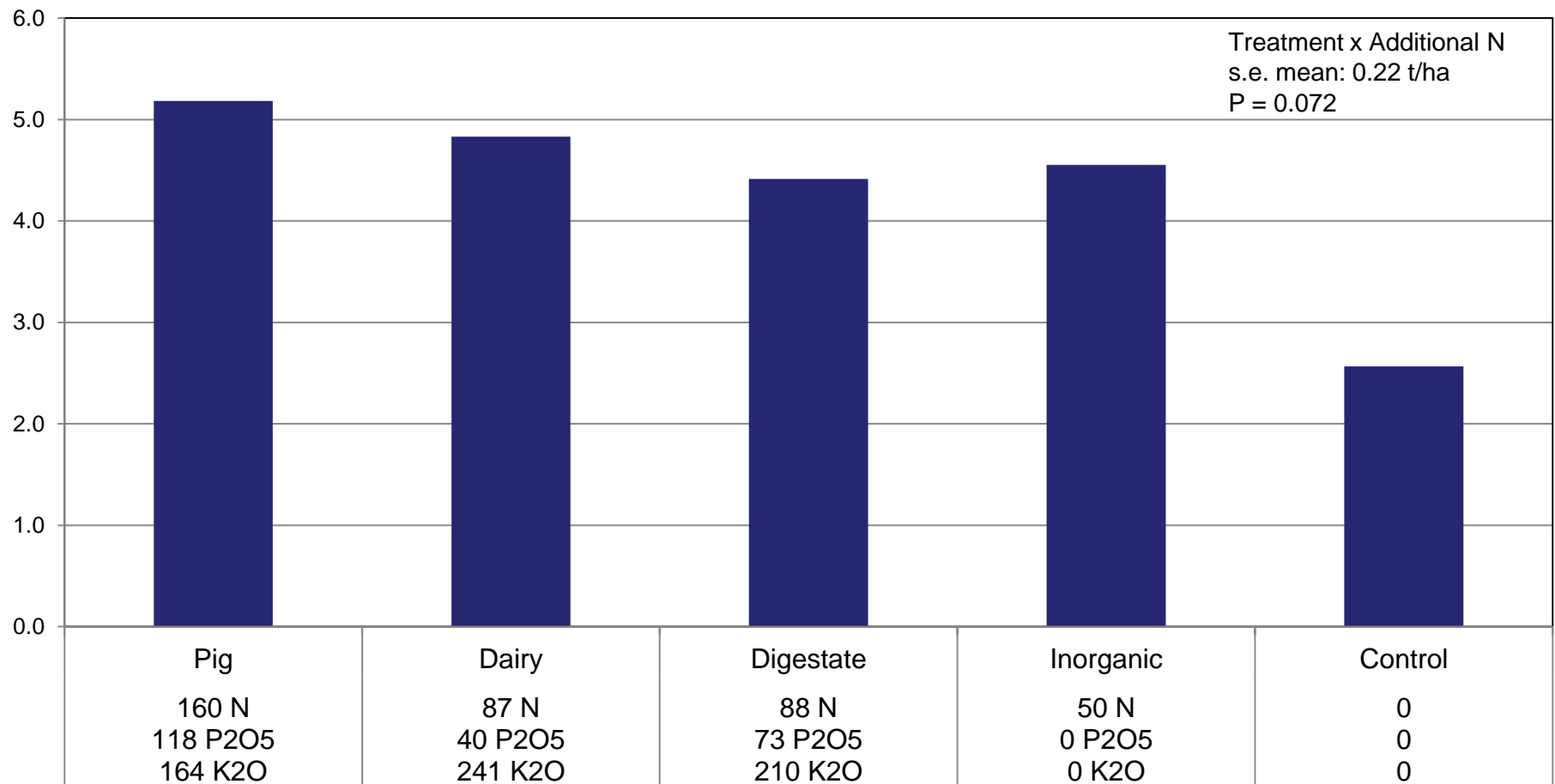
Nutrient
availability

Infiltration and
workability

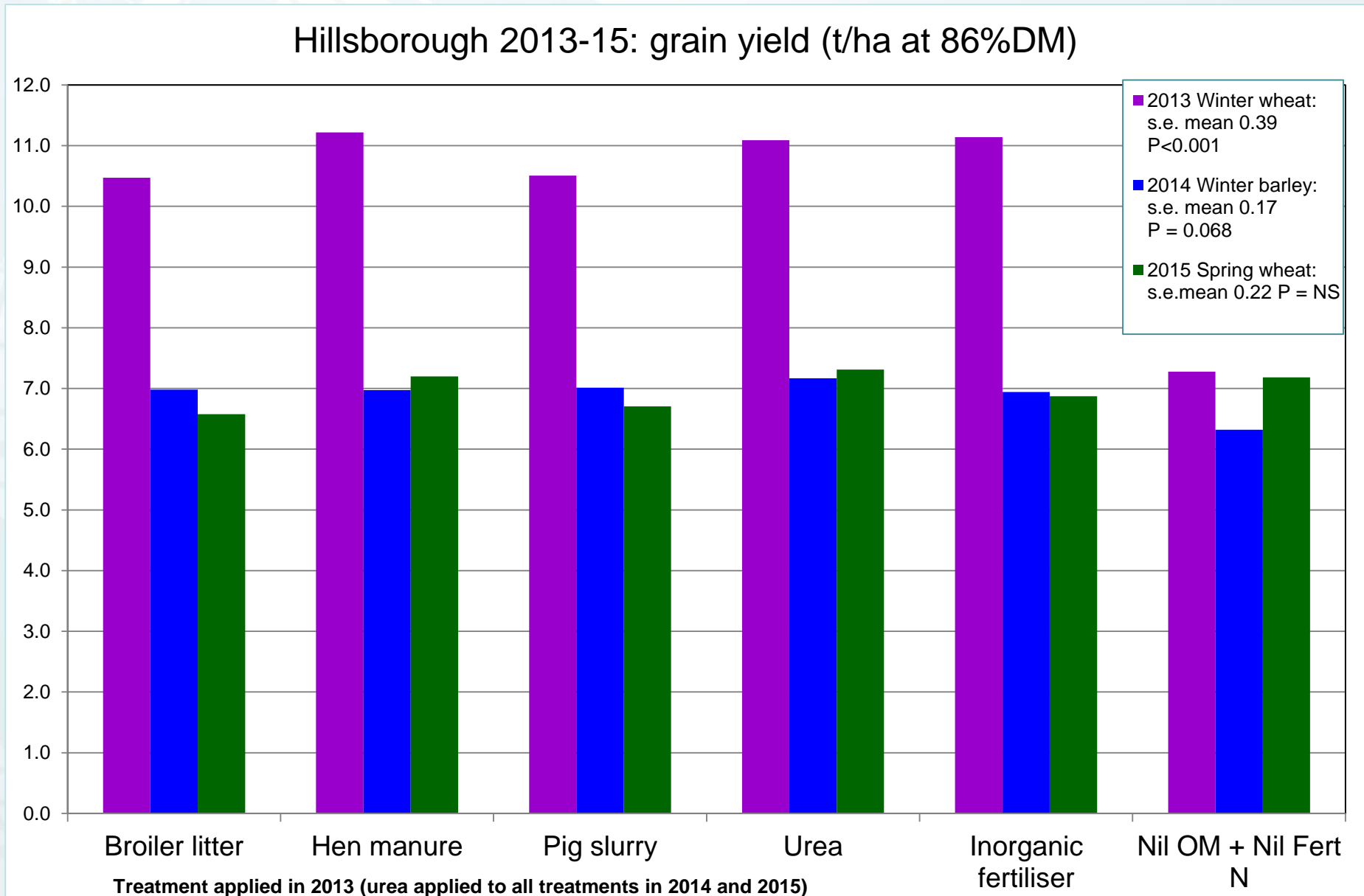
Results from the COMS project

- Grain yields were similar from all sources of nutrients – whether organic or inorganic

Crossnacreevy 2014: grain yield of spring barley (t/ha at 85%DM)

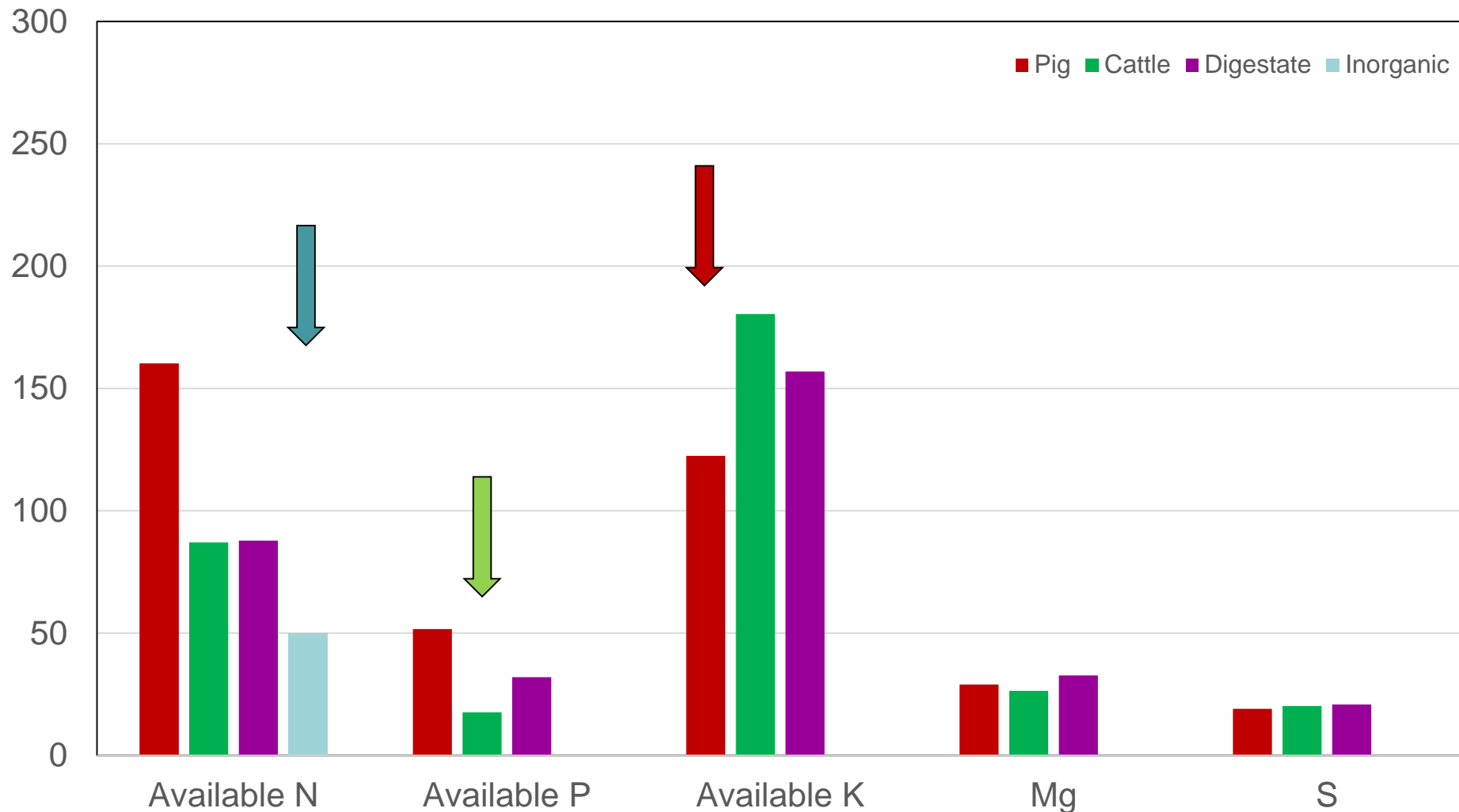


- Legacy effects of organic materials (or inorganic nutrients) were not evident

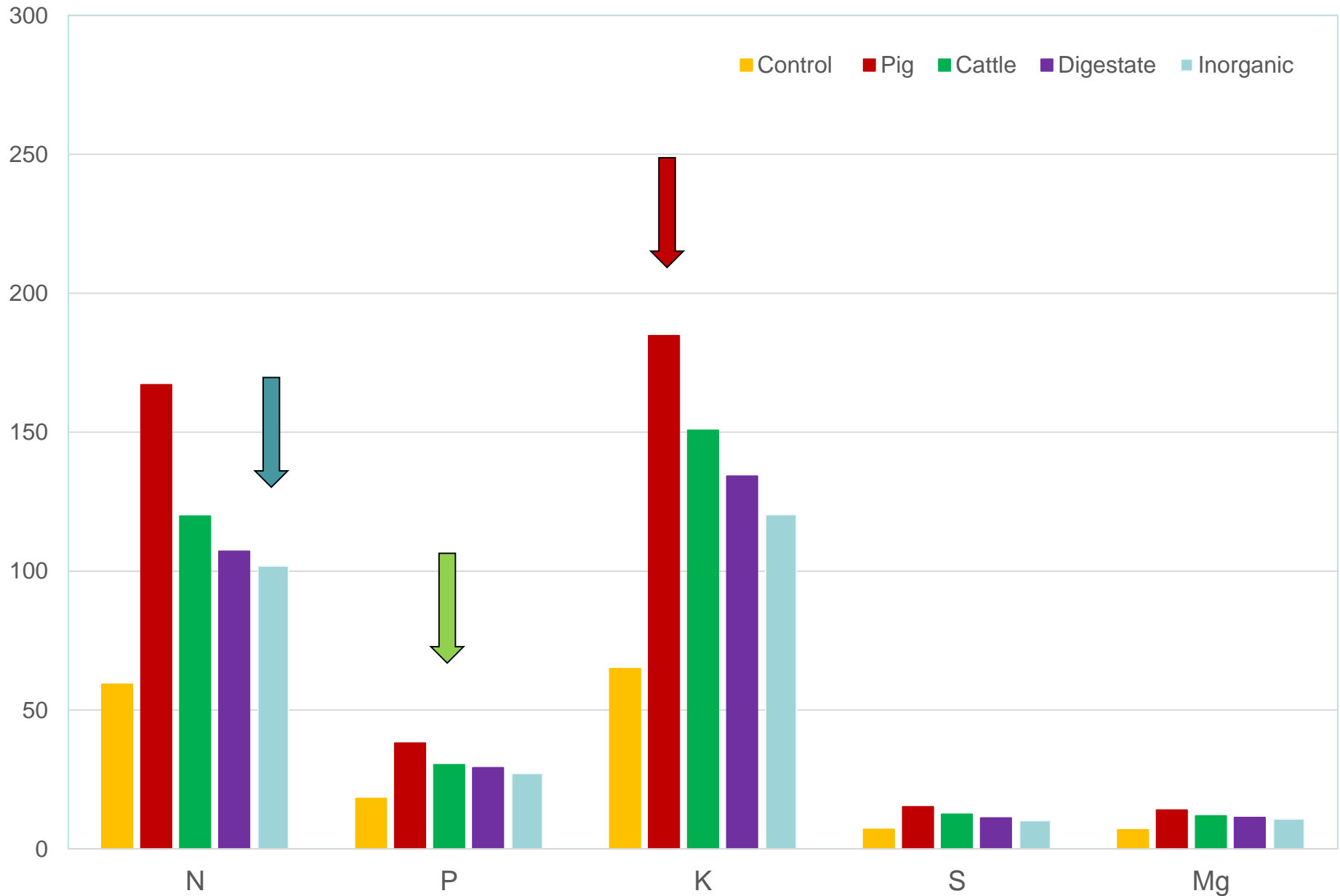


- Differences in the amounts of nutrients applied did not affect yield but did affect nutrient offtake

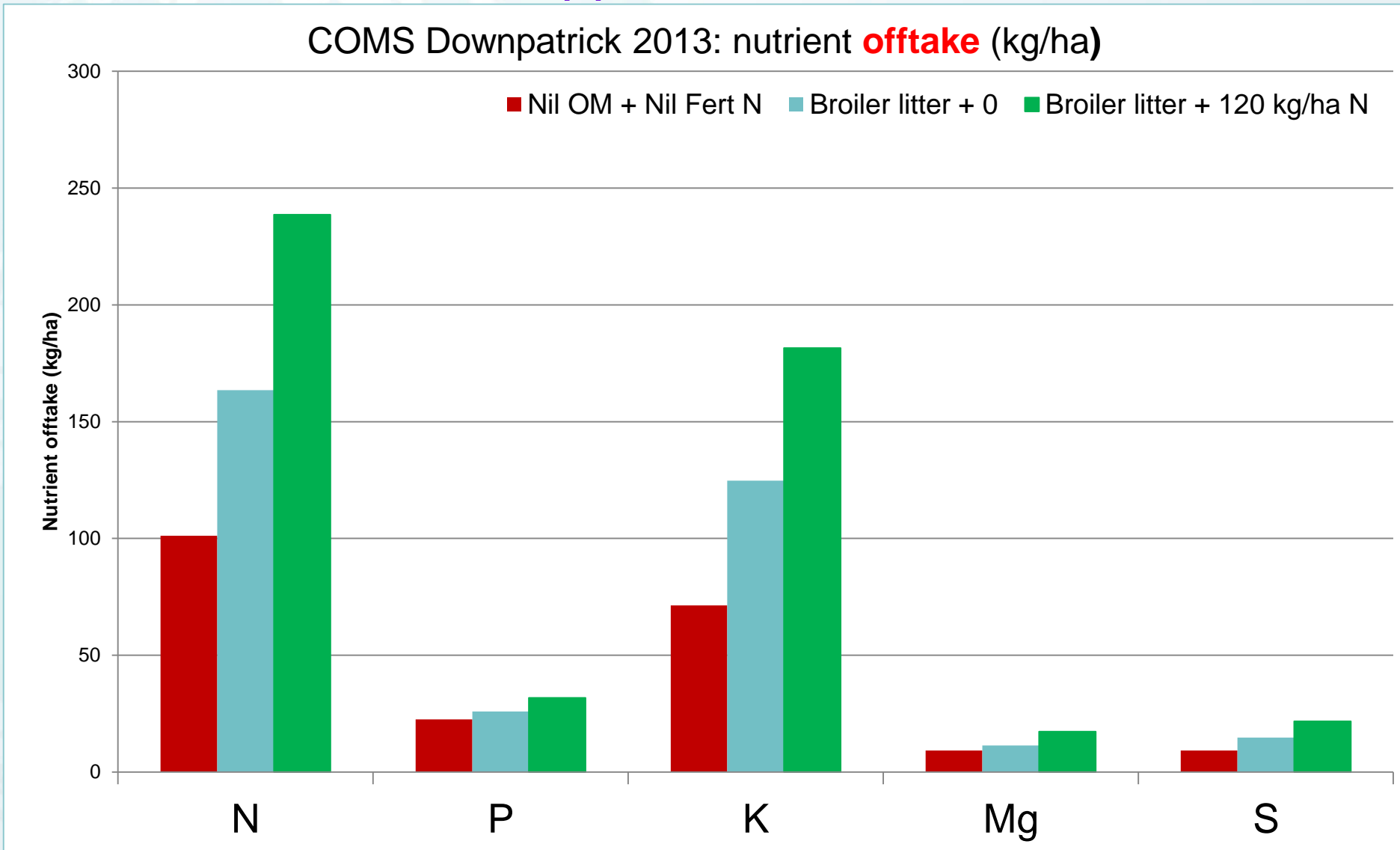
Crossnacreevy 2014: nutrients **applied** (kg/ha)



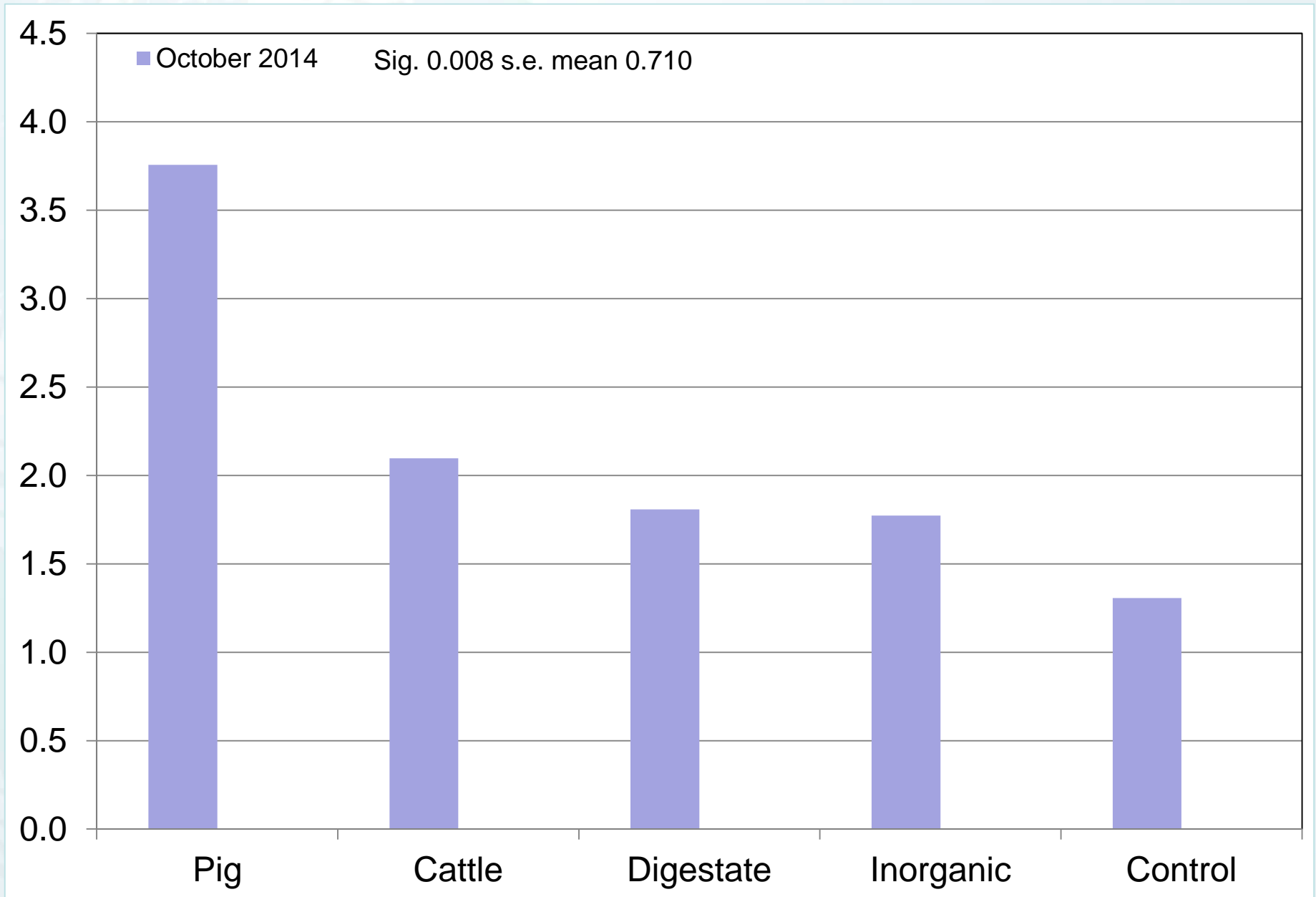
COMS Crossnacreevy 2014: nutrient **offtake** (kg/ha)



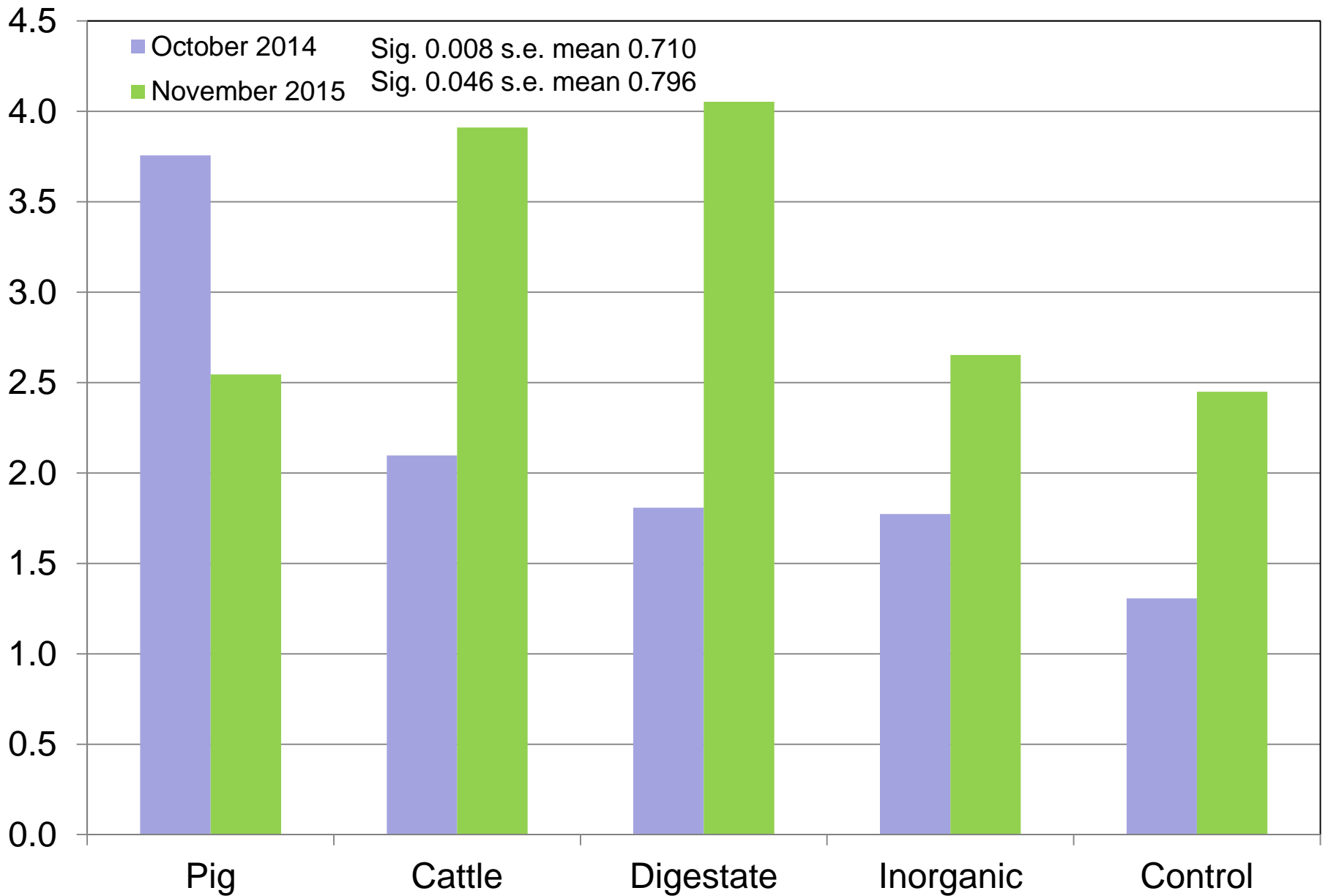
- Application of an inorganic topdressing along with the organic material enhanced offtake of nutrients other than those supplied



COMS Crossnacreevy Earthworm biomass (g)



COMS Crossnacreevy Earthworm biomass (g)



Some conclusions from COMS project

- Grain yields were similar from all sources of nutrients – whether organic or inorganic
- Legacy effects of organic materials (or inorganic nutrients) were not evident
- Nutrients applied affected nutrient offtake
- Nutrient offtake enhanced by inorganic top dressing
- Provision of e.g. minor nutrients (Mg and S) and trace elements in the organic materials replenishes those removed by the crop from the soil
- Earthworms respond to organic materials but the biggest impact on their presence and activity is cultivation

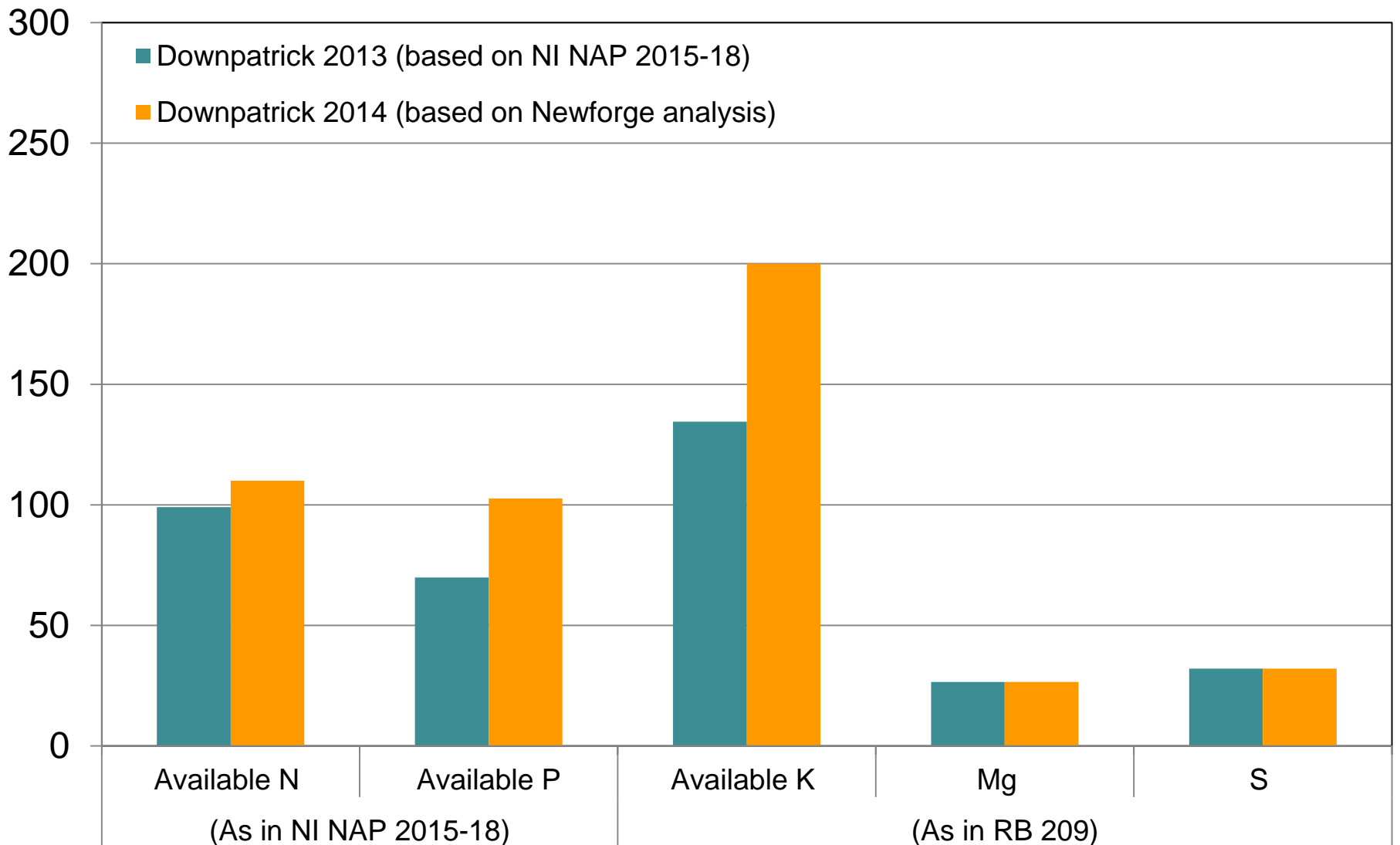
Guidance about using organic manures

Limits to amounts (from NI NAP 2015-18):

- Livestock manure N loading: 170 kg N /ha farm limit
- Follow N-Max for cereals
- If P content is >0.25 kg total P per kg total N, then organic materials can only be applied where the crop requires P

→ Sample the manure

COMS Downpatrick: Nutrients **applied** 2013 & 2014 (kg/ha)



Guidance about using organic manures

Limits to amounts (from NI NAP 2015-18):

- Livestock manure N loading: 170 kg N /ha farm limit
- Follow N-Max for cereals
- If P content is >0.25 kg total P per kg total N, then organic materials can only be applied where the crop requires P

→ Sample the manure

Apply nutrients from all sources to meet crop requirement, and particularly do not exceed N & P

→ Sample the soil

Apply organic materials at a time and using a method that maximises the availability of the nutrients

Adjust fertiliser applications to take account of organic manure applications


```
graph TD; OM[Organic manures] --> SMF[Soil microbiome and fauna]; SMF --> NA[Nutrient availability]; SMF --> IW[Infiltration and workability]; Q((?)) --> OM; Q --> SMF; Q --> NA; Q --> IW;
```

Organic manures

Soil microbiome and fauna

Nutrient availability

Infiltration and workability

Conclusions

- Take-home messages:
 - Use both organic materials and fertiliser
 - Follow Nitrates Action Programme guidance
 - Over-years benefits from nutrient content not found
 - Applying organic manures is a good investment