Developing alternative legume mixtures the farmers' perspective

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Further information is available from:
[1]SAC, Craibstone Estate, Aberdeen AB21 9YA, Scotland.
[2]North Wyke Research, Devon.
[3]IBERS, Aberystwth.
[4]The Organic Research Centre, Berkshire.
[5]Duchy College, Cornwall.
[6]The Arable Group, Norfolk.
[7]Rothamsted Research, Hertfordshire.







Fertility building research

OF363 Novel legumes to build soil fertility

OF0316 Developing improved guidance for the use of fertility building crops

LK09106

Legume based mixtures to enhance NUE & economics of cropping systems

Aims

- **characterize legume species**
- **improve N use efficiency**
- create a legume based mixture: **improved resilience**

Plant species

CLOVERS
Alsike Clover
Crimson clover
Red clover
White clover

Other LEGUMES
Birdsfoot trefoil
Black medic
Large birdsfoot trefoil
Lucerne
Meadow pea
Sainfoin
White sweet clover
Winter vetch

GRASSES
Italian ryegrass
Meadow fescue
Perennial ryegrass
Timothy

1. WHITE CLOVER
2. WHITE SWEET CLOVER
3. ALSIKE CLOVER
4. CRIMSON CLOVER
5. LUCERNE
6. WINTER VETCH
7. MEADOW PEA
8. BLACK MEDIC
9. SAINFOIN
10. BIRDSFOOT TREFOIL
11. LARGE BIRDSFOOT TREFOIL
12. ITALIAN RYEGRASS
13. PERENNIAL RYEGRASS
14. MEADOW FESCUE

LK09106
Legume based mixtures to enhance NUE & economics of cropping systems

Improve productivity of rotation and minimise N losses

Low input & organic farming systems rely on legumes to build fertility usually white/red clover & ryegrass to :

- Build biomass
- Fix N
- Control weeds
- Provide quality forage in livestock systems
- Be tolerant to weather/soils/pest/diseases

but scope ***to improve the efficiency of N fixation and transfer*** from fertility building to cropping phase (beyond good management practice)

Aim – to develop and test concept of complex legume based mixtures to provide data on which to base commercial seed mixes

N fixation in some legumes limited by establishment-
aim to grow a rich complementary mix of species to allow for 'redundancy' and enable 'stability' and facilitation between species.

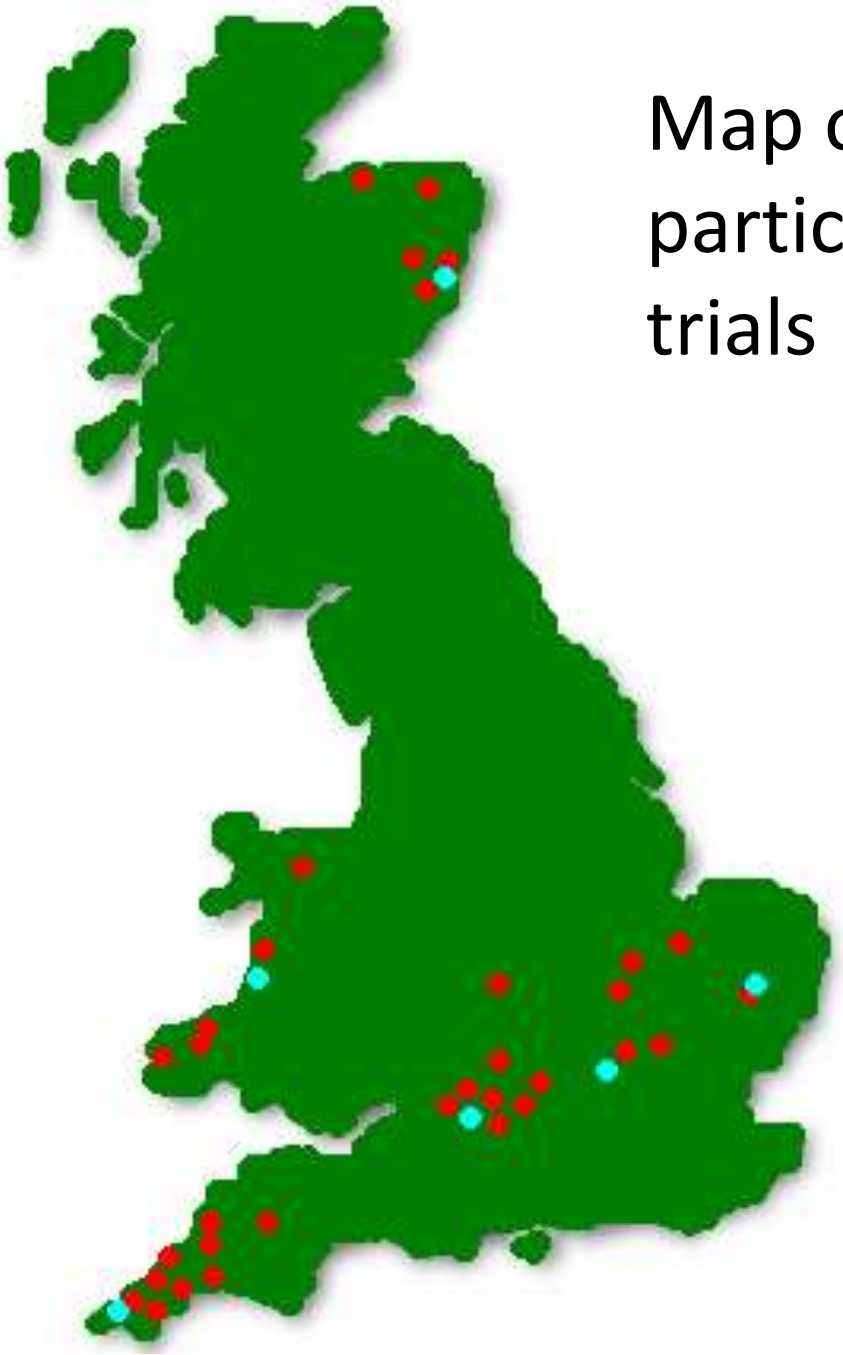
Synchrony -range of species; manipulation of residue to alter rate and timing of N release & reduce environmental losses by combining for example : woody/non woody,,Shallow & deep rooting; Tannins & lignins

Project-
Six research hubs growing 14 species and mixtures over two years.
Detailed measurements of species and mixtures to build model

'All species mixture 'grown by 35 commercial farmers across UK along side their 'normal' fertility building ley

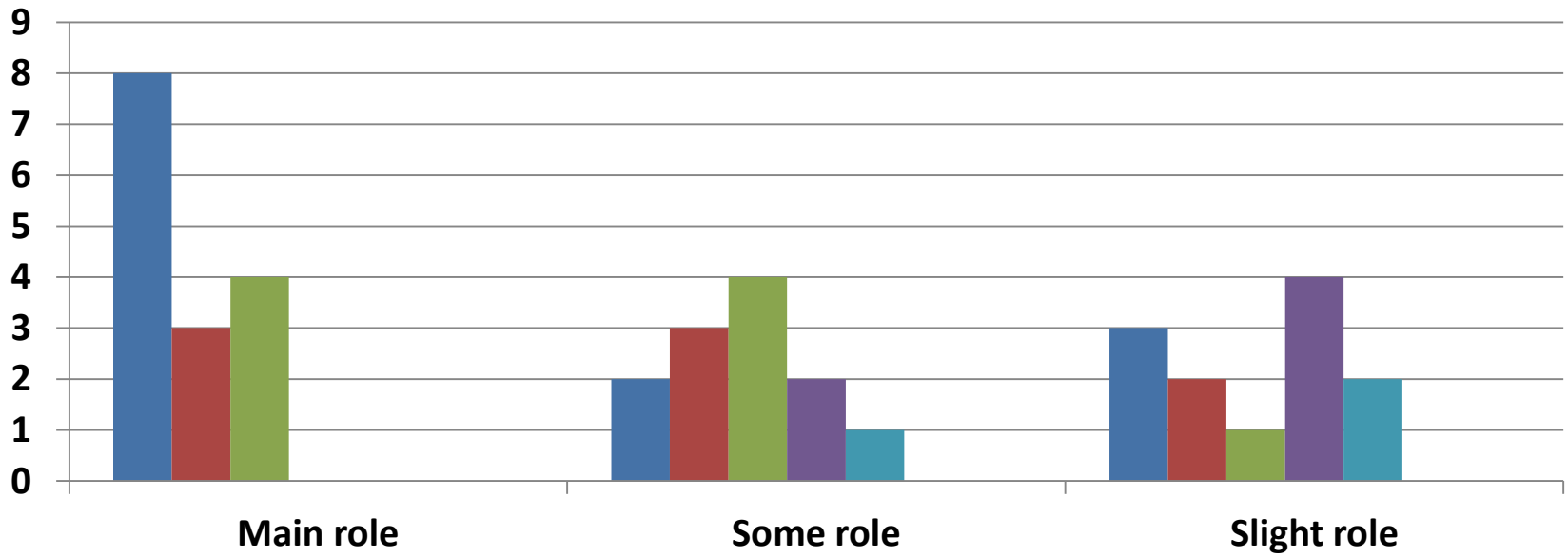
Plots at ‘hubs ‘

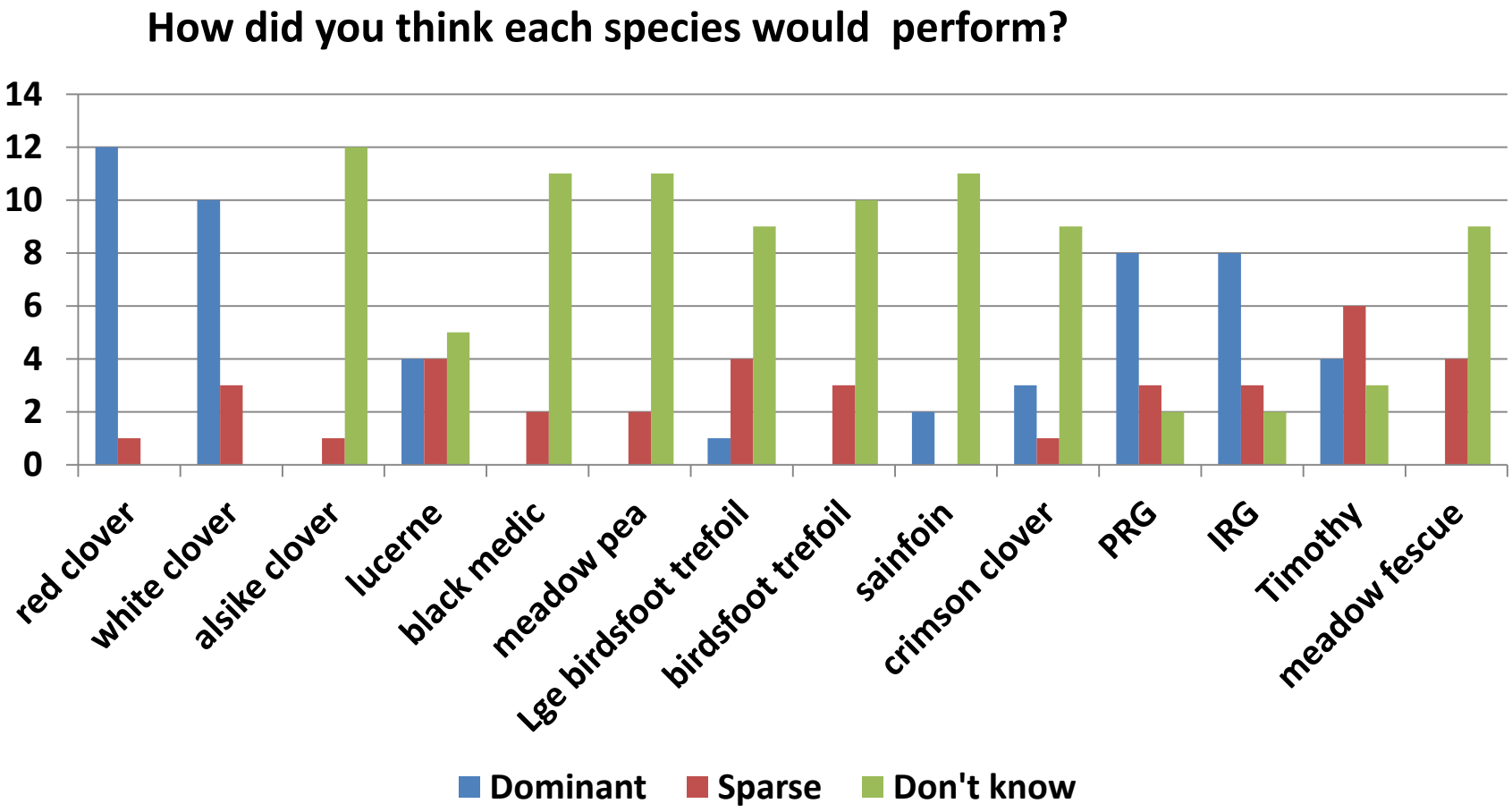
35 participatory commercial organic farmers across UK



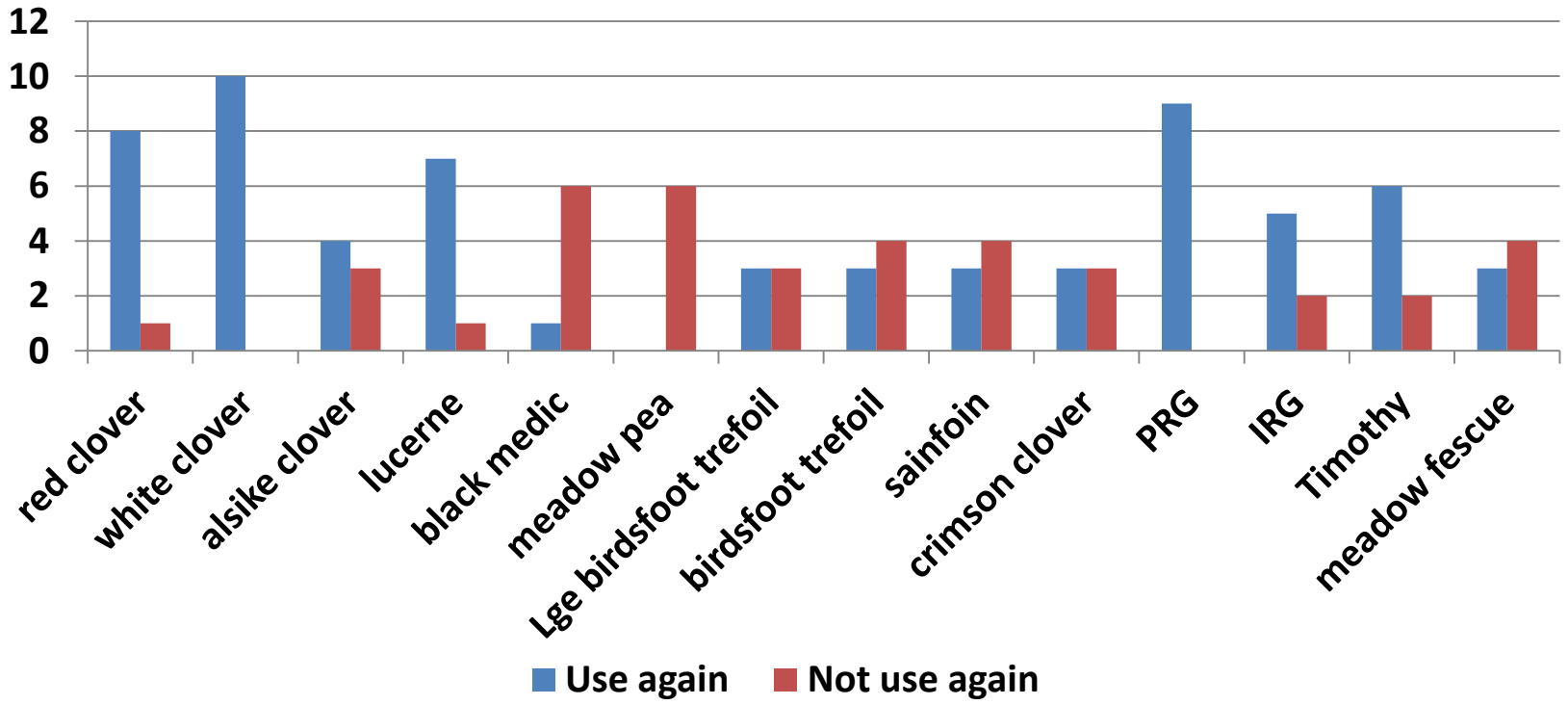
Map of 35 participatory trials

Three most important roles of legume mix on farm

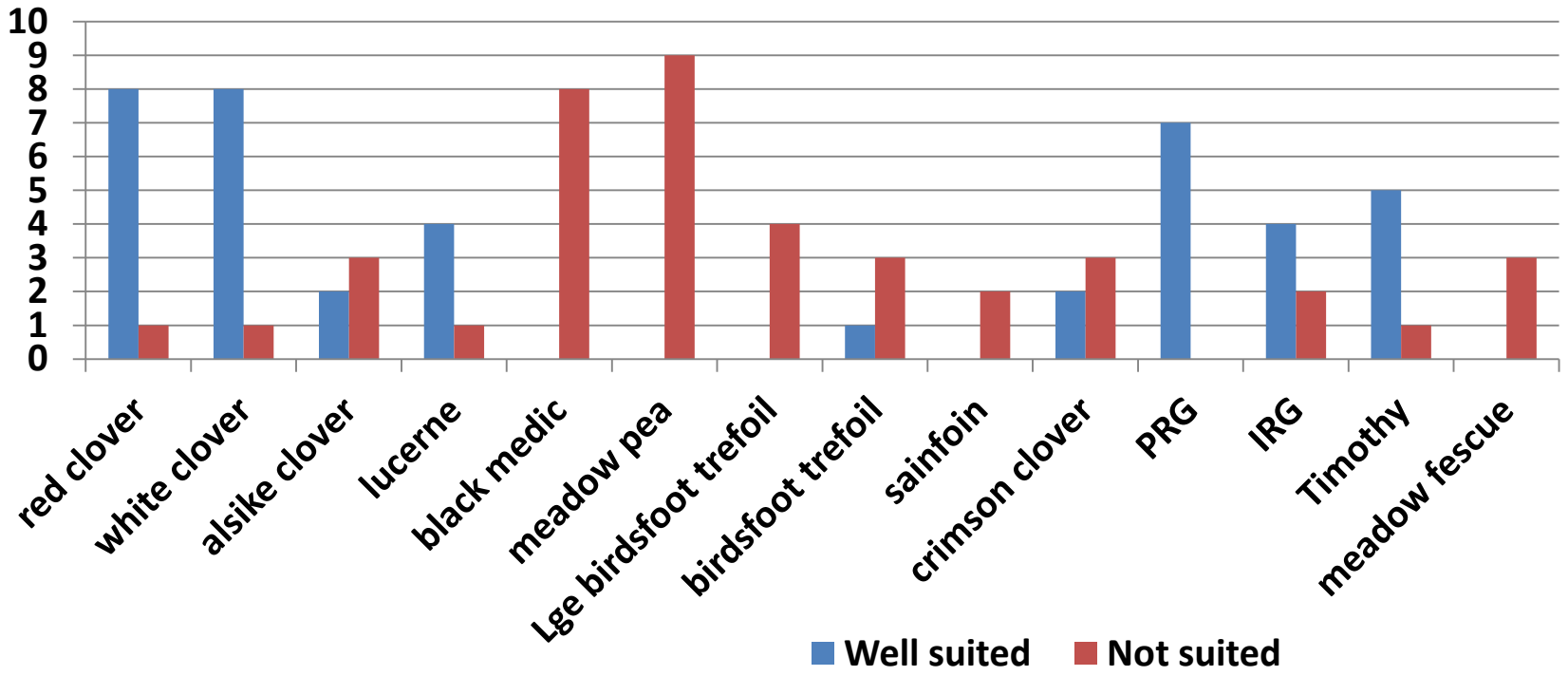



How did you think each species would perform?
14
12
10
8
6
4
2
0
red clover
white clover
alsike clover
lucerne
black medic
meadow pea
Lge birdsfoot trefoil
birdsfoot trefoil
sainfoin
crimson clover
PRG
IRG
Timothy
meadow fescue
Dominant
Sparse
Don't know

Which spp would you use/not use again?

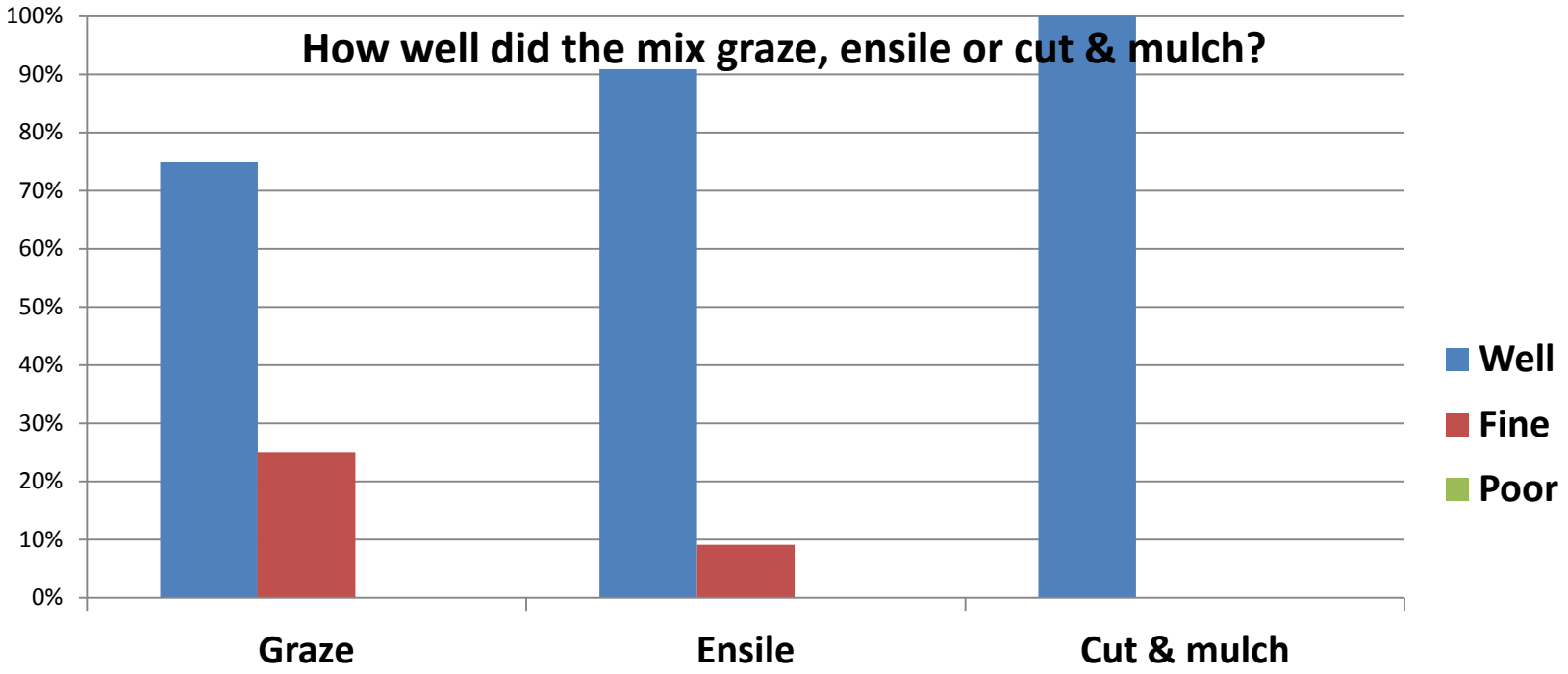


Which spp were suited or not suited to your system?



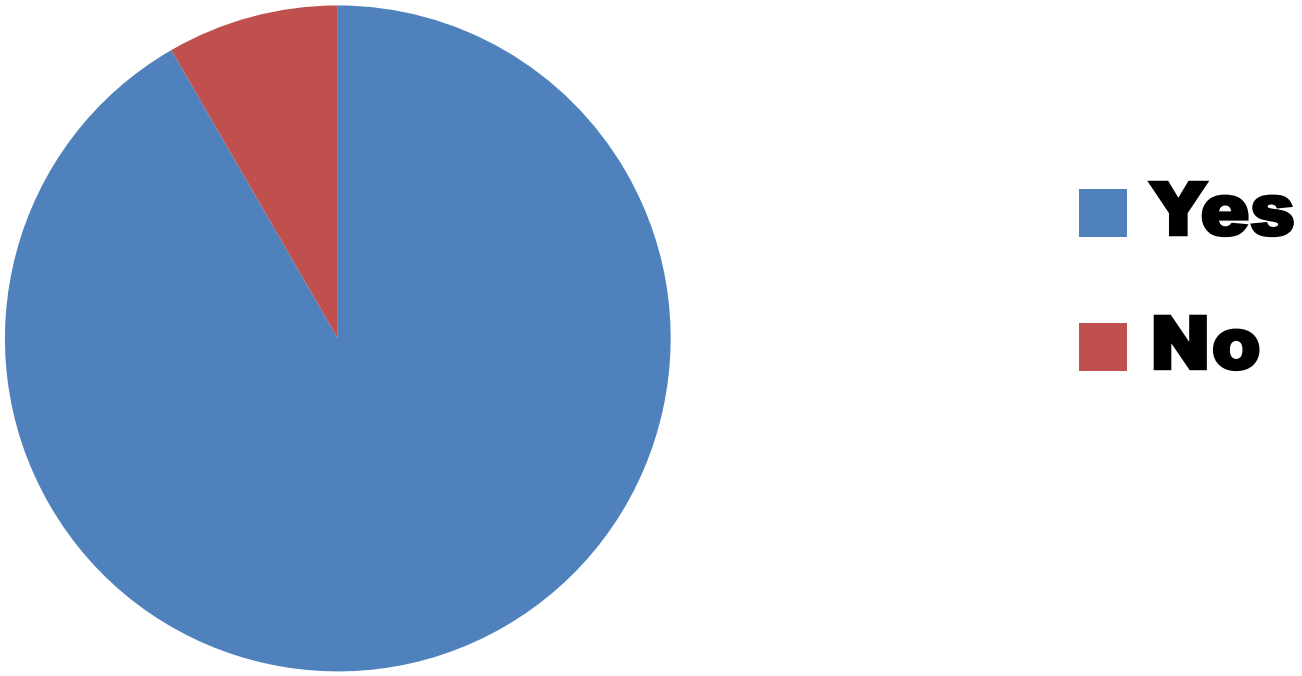
PROBLEMS WITH ASM
drilling
different seed sizes didn't sow well
worried about IRG volunteering in wheat/trit crop
didn't fit in with rest of silage but good yield

How did the mix perform compared to usual mix?

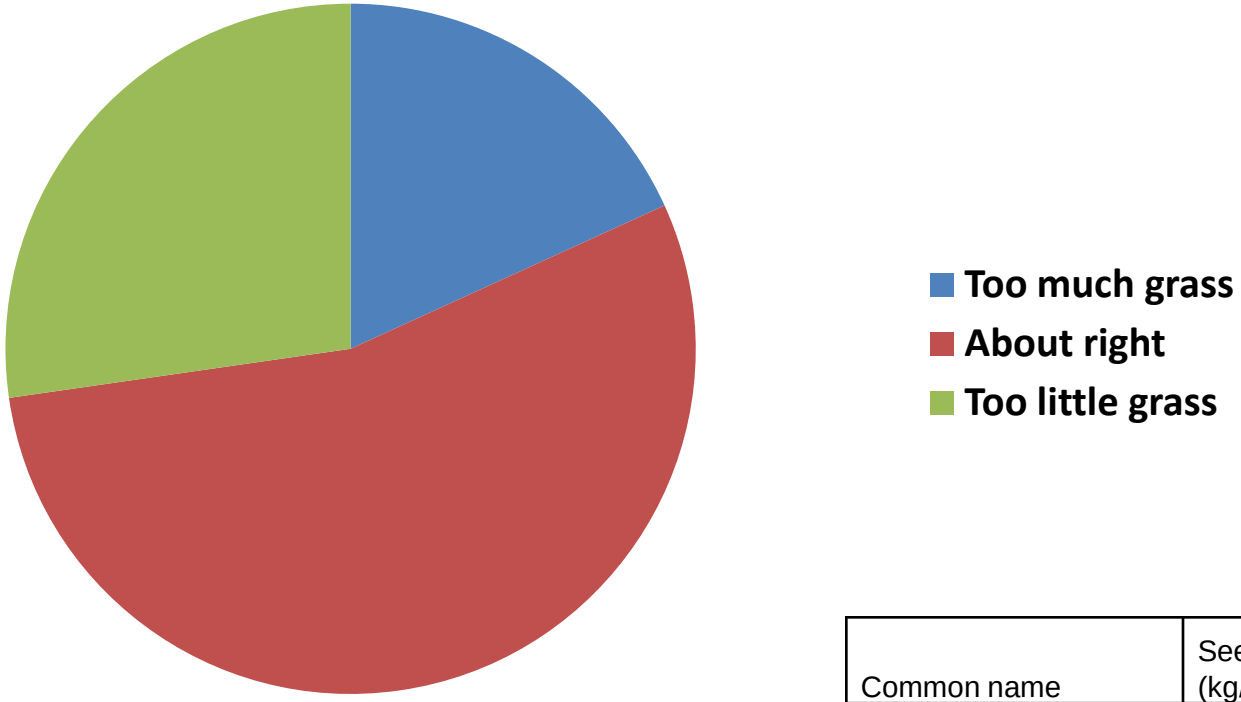


Comments from farmers:
expected higher yield
less yield more docks grazing ok
less yield more weeds
more open
more open but no more weeds
higher yield & taller
poorer ground cover & longer to get started
sheep grazed the ASM area more
prefer more ryegrass 4 ensiling

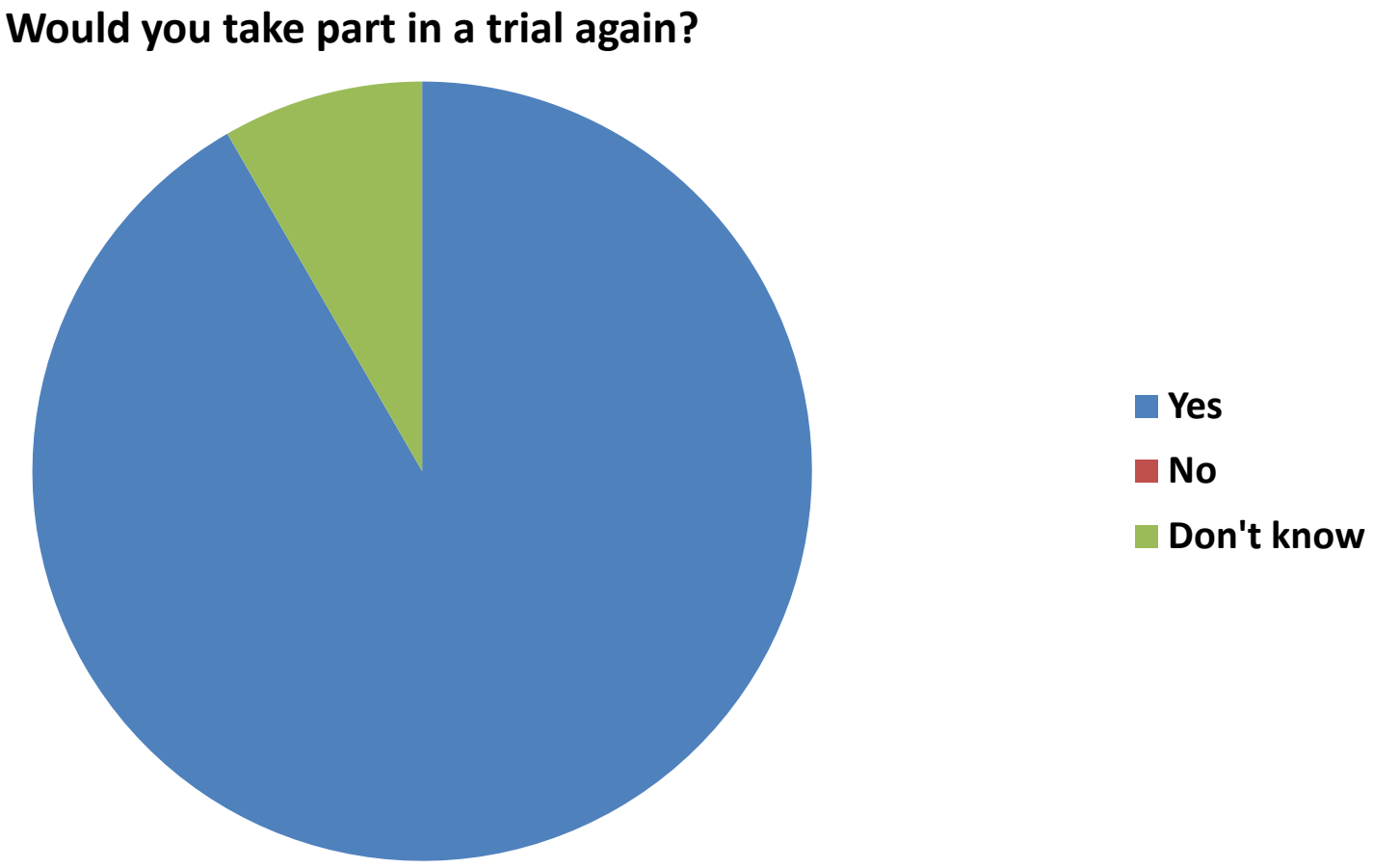
Would you use a legume mix again?



Was the seed mix well balanced?



Common name	Seed rate within ASM (kg/ha)
Sainfoin	5
red clover	2.5
lucerne	2.5
Large birdsfoot trefoil	2.5
Black medic	2.5
white clover	1.5
Alsike clover	1.25
Birdsfoot trefoil	2.5
crimson clover	2.25
Meadow Pea	3.25
Perennial ryegrass	**2.5**
Italian ryegrass	**1.0**
Timothy	**0.5**
Meadow fescue	**1.25**


Would you take part in a trial again?
Yes
No
Don't know

THANK YOU

TO ALL FARMERS AND PARTNERS