

# Developing sustainable permanent grassland systems and policies across Europe: SUPER-G

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  - Focus on livestock grazing systems dominated by permanent grassland (PG)
  - Improving management practices
- SUPER-G project
  - Overall aims & objectives
  - Multi-actor & transdisciplinary approach
  - Examples of decision support tools
  - Co-innovation & co-production of new tools & management approaches

# Background

- Efficient management of PG – key to productivity & profitability
- Strong link between grass utilisation & profitability
- Dependent on policies & financial mechanisms
- Society dependent on the ecosystem services (ES) provided by PG
- How to retain PG and the rural communities that depend on them?



# SUPER-G – overall aims & objectives

SUPER-G will apply a **multi-actor approach** to:

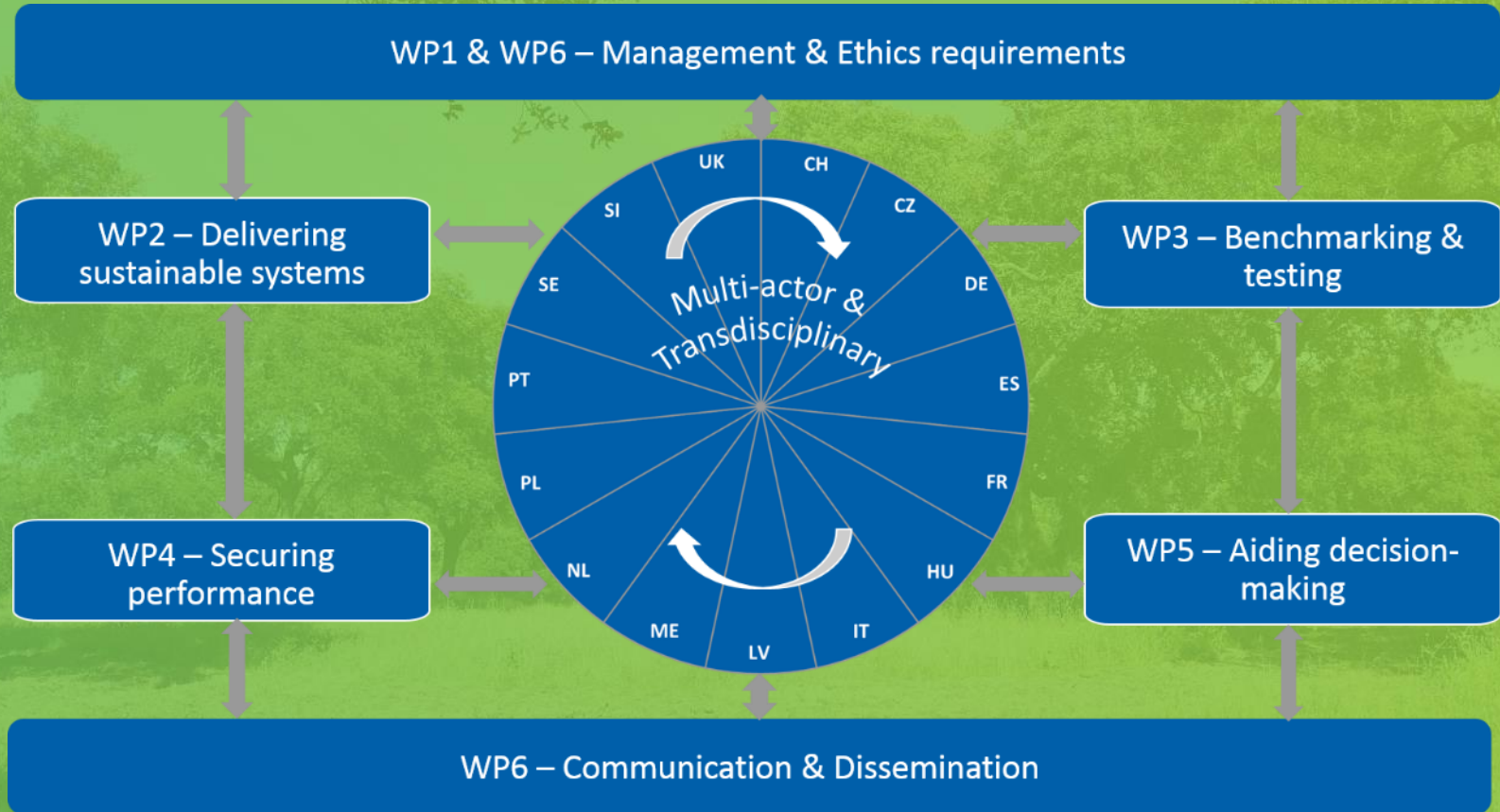
- **Better understand the importance and functioning of PG** within a range of European biogeographic regions and farming systems
- **Benchmark PG performance across Europe**
- **Co-develop integrated approaches** for profitable and sustainable PG management
- **Co-develop tools and policy mechanisms** to support the maintenance and sustainable management of PG

# Permanent grassland (PG)

*“any land dominated by grasses or herbaceous forage that can be grazed/mown and has not been included in the crop rotation of a holding for five years or more”*

# Ecosystem services & farming systems

- Ecosystem services (ES):
  - Food production
  - Biodiversity
  - Climate regulation (including carbon sequestration)
  - Water quality
  - Mediation of water flows
  - Erosion control
  - Landscape and recreation
- From ***intensified farming systems*** to ***remote*** and ***high-mountain*** areas
- Natural, semi-natural and agriculturally improved



# SUPER-G five biogeographic regions



**Boreal**

**Atlantic**

**Continental** (*incl. Pannean*)

**Alpine**

**Mediterranean**

Source: [https://www.eea.europa.eu/data-and-maps/figures/biogeographical-regions-in-europe-1/map\\_2-1\\_biogeographical-regions.eps/image\\_large](https://www.eea.europa.eu/data-and-maps/figures/biogeographical-regions-in-europe-1/map_2-1_biogeographical-regions.eps/image_large)

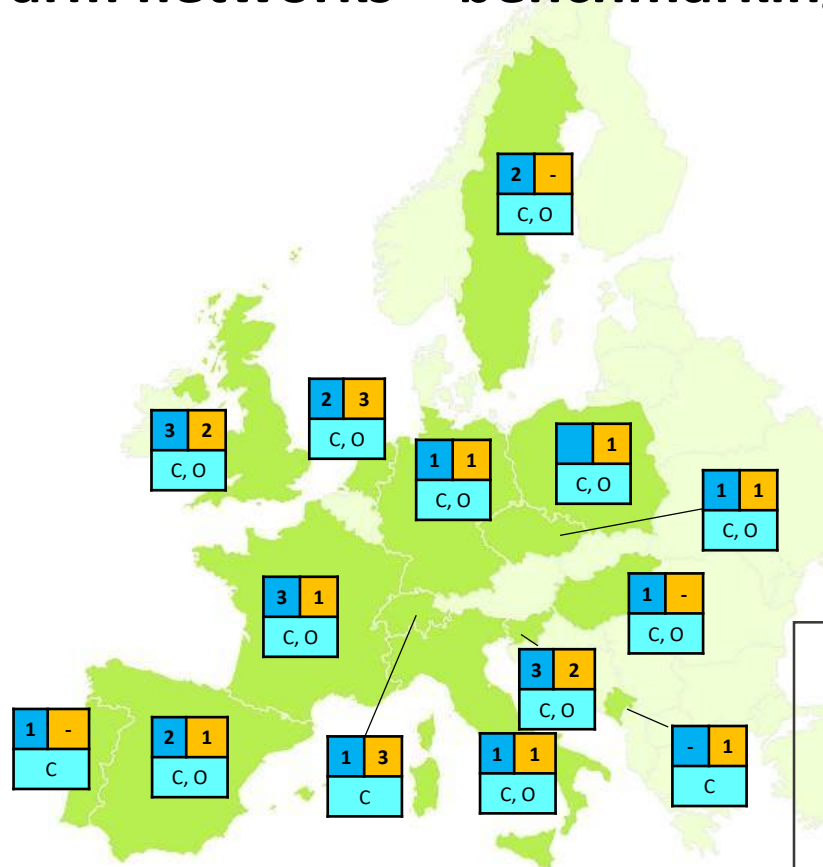


# SUPER-G partner organisations



- Atlantic
- Continental
- Pannonian
- Alpine
- Boreal
- Mediterranean

# Farm networks – benchmarking & testing



Livestock type	Biogeographic region	Country
Sheep	Alpine, Cont, Med, Boreal, Pan, Atl	CH, SI, UK, SE, FR, ES, PT, HU, ME, NL, DE
Dairy	Alpine, Cont, Med, Cont, Atl, Boreal, Pan	CH, SI, IT, NL, UK, FR, SE, CZ, PT, HU, ME, DE, PL
Beef	Alpine, Med, Boreal, Cont, Atl	CH, SI, IT, UK, SE, ES, PT, PL
Pigs	Med, Alpine	ES, PT, SI
Horses	Alpine, Cont, Boreal	DE, SE, SI
Goats	Alpine, Cont, Med	SI, PT

Networks  
 Conventional (C) or organic (O) networks

X	X
C, O	

Experimental platforms

## Potential management practices

- Applying various grazing systems to improve productivity, grass utilisation and the delivery of other ES (e.g. C sequestration)
- Demonstrating and validating the use of canopy sensing to monitor grass growth and quality
- Testing virtual fencing for more flexible grazing management
- Using diverse seed mixes to investigate the potential to increase productivity in low input systems and tolerate drought and/or waterlogged conditions
- Providing enhanced pollination
- Combining robotic milking with grazing

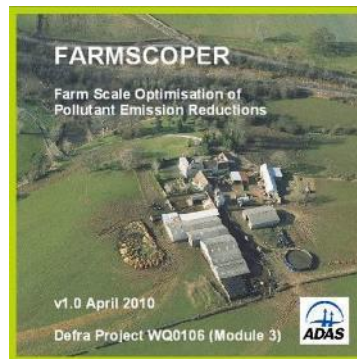
# Securing PG performance

- Consumer/citizen focus groups
- Monetary & non-monetary values
- Socio-economic drivers & barriers for farmer adoption
- Review existing policies & impacts
- Integrated approaches for permanent grassland management
- Developing appropriate policy options & information for decision support tool (DST) development



## Decision Support Tools

- AgriNet Grass (Ireland)
- GrassCheck (UK)
- FARMAX (New Zealand)
- Healthy Grassland Soils (UK)
- Farmscoper (UK)
- Mountain Grazing Farmers (Slovenia)
- PastureBase (Ireland)
- Cows & Opportunities (Netherlands)
- Forage for Knowledge (UK)
- Free Walk Farmers (Europe)



- Long term grass growth and quality monitoring project
- Grass growth forecasting:
  - 7 day
  - 14 day
- Network of 48 commercial dairy, beef and sheep grass monitor farms
- Range of systems, land type, growth potential and management intensity



**Fig. 1:** 2018 GrassCheck farm network



Grass growth



Grass quality

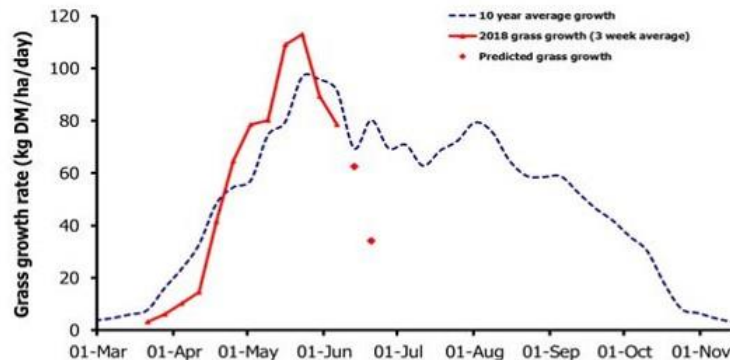
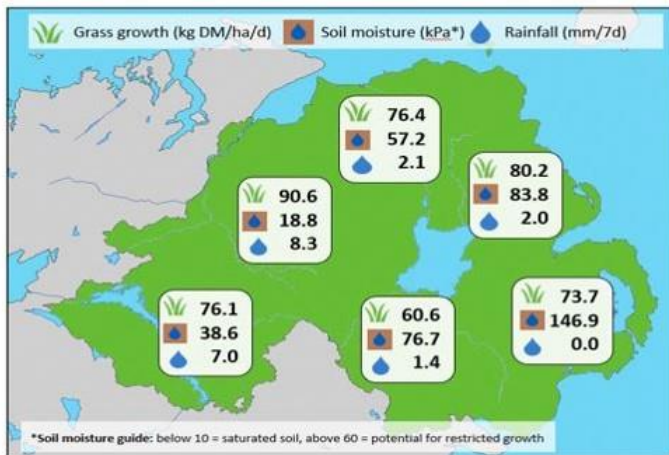


Weather data



**Fig. 2:** Latest info available at [AgriSearch.org/GrassCheck](http://AgriSearch.org/GrassCheck)

## Week Beginning 11 June 2018



### MANAGEMENT NOTES:

- Growth has fallen in the past week in line with predictions and due to the dry conditions experienced particularly in the eastern counties of N.I.
- Predictions this week show a dramatic fall in grass growth based on weather forecasts and current dry soil conditions at AFBI Hillsborough. These extremes haven't been witnessed since June 2008 and it is likely that these predictions will be localised to areas which continue to receive little rainfall.
- However, a large range in growth rates is currently evident across GrassCheck farms (24 – 137kg DM/ha/day). Wetter farms or those which have received localised heavy rainfall recently are expected to maintain current growth rates.
- Grass quality remains low across much of the province due to the stress on the plant from dry weather. Testing grass and reviewing current supplementation rates for stock to meet animal requirements for target performance.

Weekly Grass Growth (kg DM/ha/day)		Grass Quality	
		Plots	On-farm
GrassCheck plots	78.2	DM (%)	21.8
Dairy farms*	88.5	ME (MJ/kg DM)	11.1
Beef & sheep farms*	71.5	CP (% DM)	16.0
Forecast	7 day	WSC (% DM)	15.7
	14 day		10.6

\*On-farm grass growth data supplied by AgriNet

\*GrassCheck plots receive 270 kgN/ha/year



# Estimating crop available nutrients





# Healthy Grassland Soils



Structure quality	Identification of structural problem eg limiting layer	Soil structure features	Descriptor
<p><b>Scale 1</b> <b>Friable</b> Aggregates readily crumble with fingers</p> <p><b>Management Options</b> Re-assess after equipment crosses the ground or grazing in wet conditions every two years.</p>		<ul style="list-style-type: none"> <li>Small (&lt;4mm), round</li> </ul>	<ul style="list-style-type: none"> <li>Good soil structure</li> <li>Highly porous</li> <li>Many roots</li> <li>Small swardly sward</li> <li>No signs of compaction</li> </ul>
<p><b>Scale 2</b> <b>Intact</b> Aggregates easily break apart</p> <p><b>Management Options</b> Re-assess after equipment crosses the ground or grazing in wet conditions every two years.</p>		<ul style="list-style-type: none"> <li>Rounded (&gt;10mm)</li> </ul>	<ul style="list-style-type: none"> <li>Good soil structure</li> <li>Porous</li> <li>Good root distribution</li> <li>Easily small</li> <li>Some indication of aggregates</li> </ul>
<p><b>Scale 3</b> <b>Firm</b> Most aggregates break down</p> <p><b>Management Options</b> Consider infrastructure changes (eg backfencing, multiple field exits) to minimise traffic in marginal weather conditions.</p>		<ul style="list-style-type: none"> <li>Round (&gt;10mm) but some fine angular</li> </ul>	<ul style="list-style-type: none"> <li>Adequate soil strength</li> <li>Some aggregates a less friable porous</li> <li>Moderate root distribution</li> <li>No strong smell</li> <li>Some indication of porosity</li> <li>Fewer worms</li> </ul>
<p><b>Scale 4</b> <b>Compacted</b> Effort needed to break down aggregates</p> <p><b>Management Options</b> Consider use of sward tiller or oarator (if poor soil structure &lt;10cm sward tiller (if poor soil structure deeper than 10cm).</p>		<ul style="list-style-type: none"> <li>Larger (&gt;5mm) angular</li> </ul>	<ul style="list-style-type: none"> <li>Large angular aggregates (10-15cm), with very few roots seen and surface cracked/pore or cracks</li> <li>May have greyish orange mottling (big drainage)</li> <li>May have strong as the soil smells</li> </ul>
<p><b>Scale 5</b> <b>Very compact</b> Aggregates compact, difficult to pull apart and play</p>		<ul style="list-style-type: none"> <li>Large (initially &gt;10cm) angular</li> </ul>	

## Healthy Grassland Soils – Four quick steps to assess soil structure

### Step one: Surface assessment

Look at sward quality to identify potentially damaged areas which require further assessment.

<p><b>Good</b></p> <ul style="list-style-type: none"> <li>Sward intact</li> <li>No poaching</li> <li>Few wheelings</li> </ul>	<p><b>Moderate</b></p> <ul style="list-style-type: none"> <li>Surface pocked</li> <li>Wheelings in places</li> </ul>	<p><b>Poor</b></p> <ul style="list-style-type: none"> <li>Surface compacted</li> <li>Soil exposed</li> <li>Poaching</li> <li>Poor sward quality</li> </ul>
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### Step two: Soil extraction

Tip: When starting soil it is useful to dig in an area where you know there may be a problem (eg a gateway) and get familiar with signs of soil structure damage.

**Remember** Sample when the topsoil is moist – if the soil is too dry or too wet it is difficult to distinguish signs of poor soil structure.

### Step three: Soil assessment

Clarify open the soil block like a book to break it up.

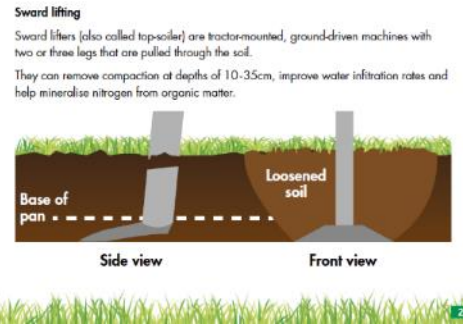
- If the structure is uniform – assess the block as a whole
- If there are two or more horizontal layers of differing structure identify the layer with the poorest structure
- Carry out the rest of the assessment on this limiting layer

### Step four: Soil scoring

Break up the soil with your hands into smaller structural units (known as aggregates)

- Assign a score by matching what you see to the descriptions and photos provided
- A score of 1 or 2 is (read): a score of 3 **Healthy** and 4 or 5 is **Poor** and requires management action
- Record depth of limiting layer to assess management options

- Visual Soil Evaluation tool for grassland
- Origins – Peerlkamp (1967) and VESS (2009) - topsoil structure and porosity
- Focus on the most structurally damaged layer
- Link to management options



# Approach to co-developing DSTs across Europe

- Review of existing tools and key gaps
- Farmer workshops to determine what tools should be developed
- Workshops for co-development and testing of farm level tools
- Development of farm level tools for assessment of productivity, profitability and ES



# Conclusions

- PG are under threat, but important within many livestock grazing systems
- Need co-development of integrated approaches for profitable & sustainable PG management
- Need co-development of approaches, tools & policy mechanisms to:
  - Support profitable livestock grazing systems
  - Maintain PG & the rural communities that depend on them



# Thank you!



**SUPER-G**  
SUSTAINABLE PERMANENT GRASSLAND