An overview of European permanent grasslands: SUPER-*G* proposals to improve their sustainability and multifunctionality

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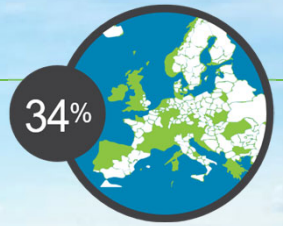
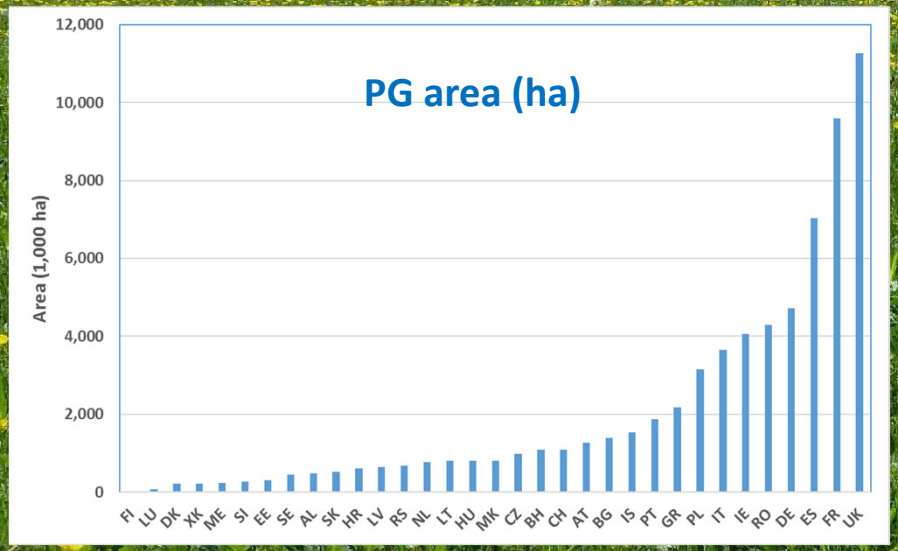
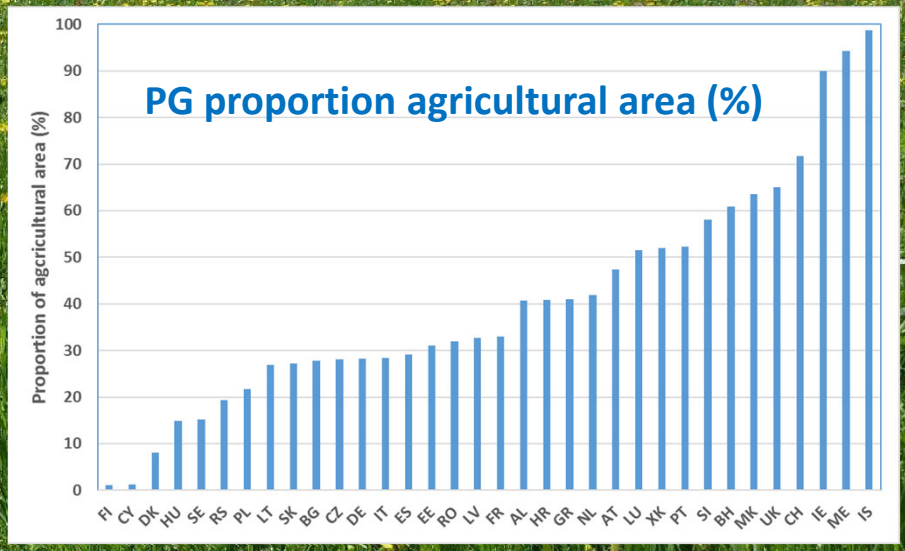
Outline

- Importance of permanent grassland (PG) in Europe
- PG types and farming systems
- Provision of ecosystem services (achieving multifunctionality)
- PG management options
- Enabling the adoption of sustainable PG systems

Permanent grasslands in Europe







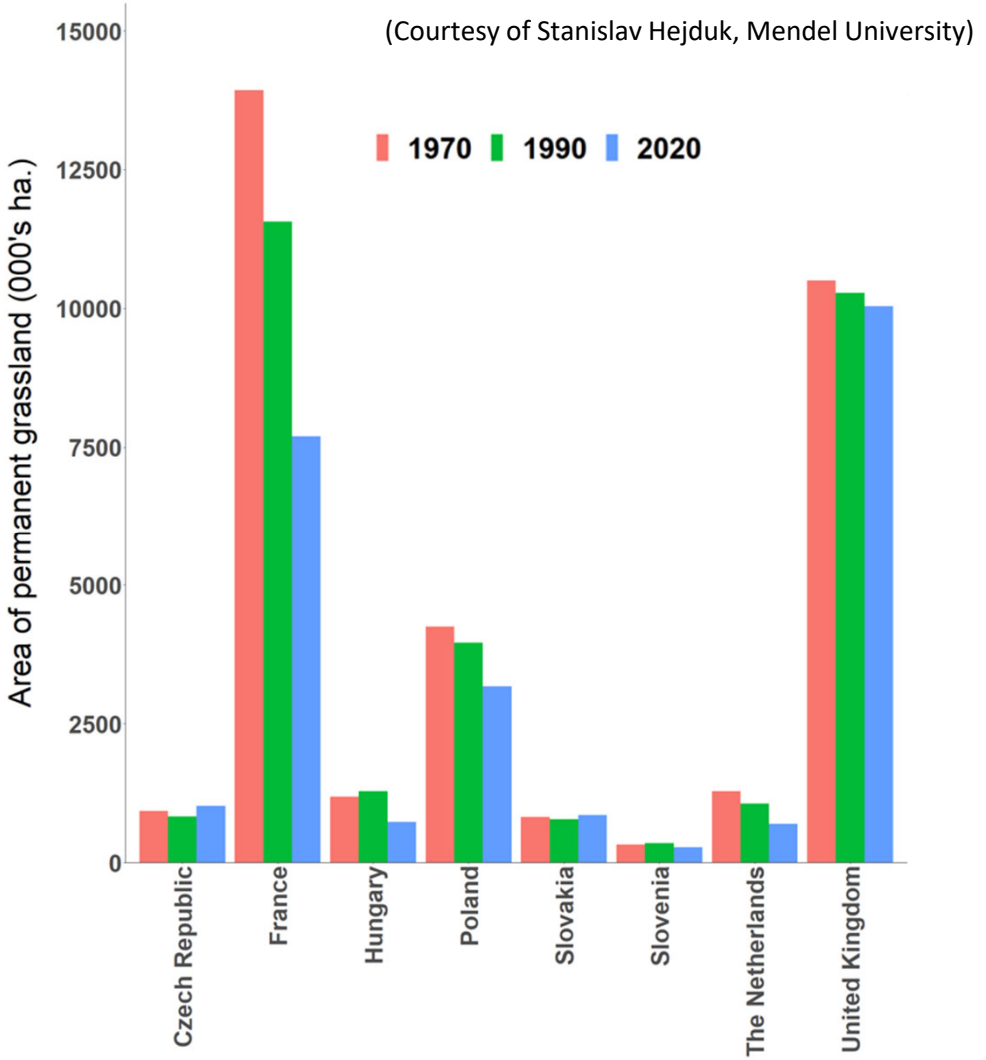
EUROSTAT, 2018

Changes in PG area (ha)

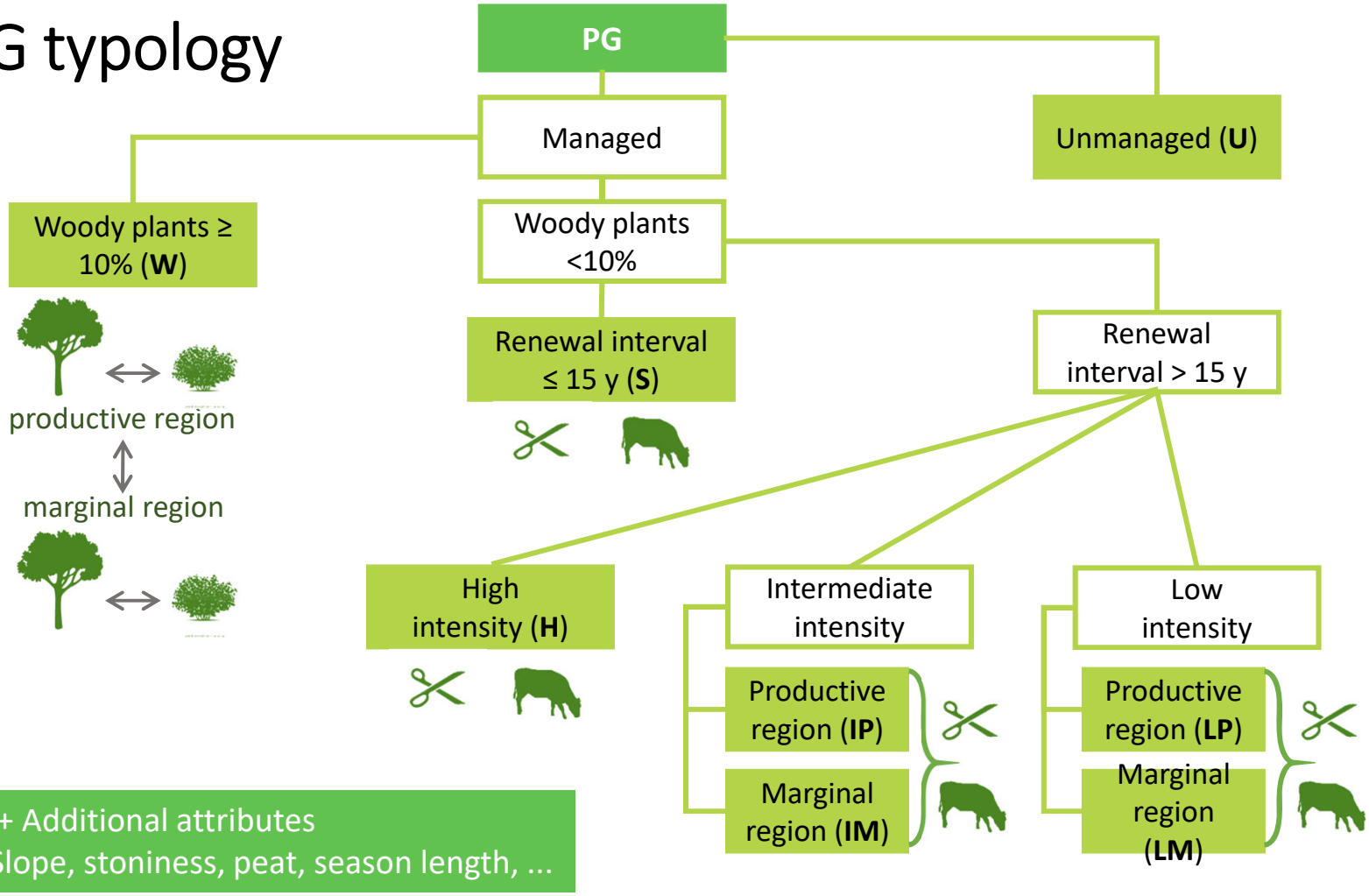
Selected countries - 1970, 1990 & 2020

- General reduction in PG area across Europe (Peyraud *et al*., 2014)
- PG losses of *c*. 30% (- *c*.7 million ha) 1970-2010 in EU-6 - Belgium, Denmark, Germany, France, Italy and Luxembourg - (Eurostat, 2017)
- Increases & decreases more recently (2005 to 2013), e.g.:
  - 50% increase (234,000 ha) in Hungary
  - 13% reduction (66,000 ha) in Sweden

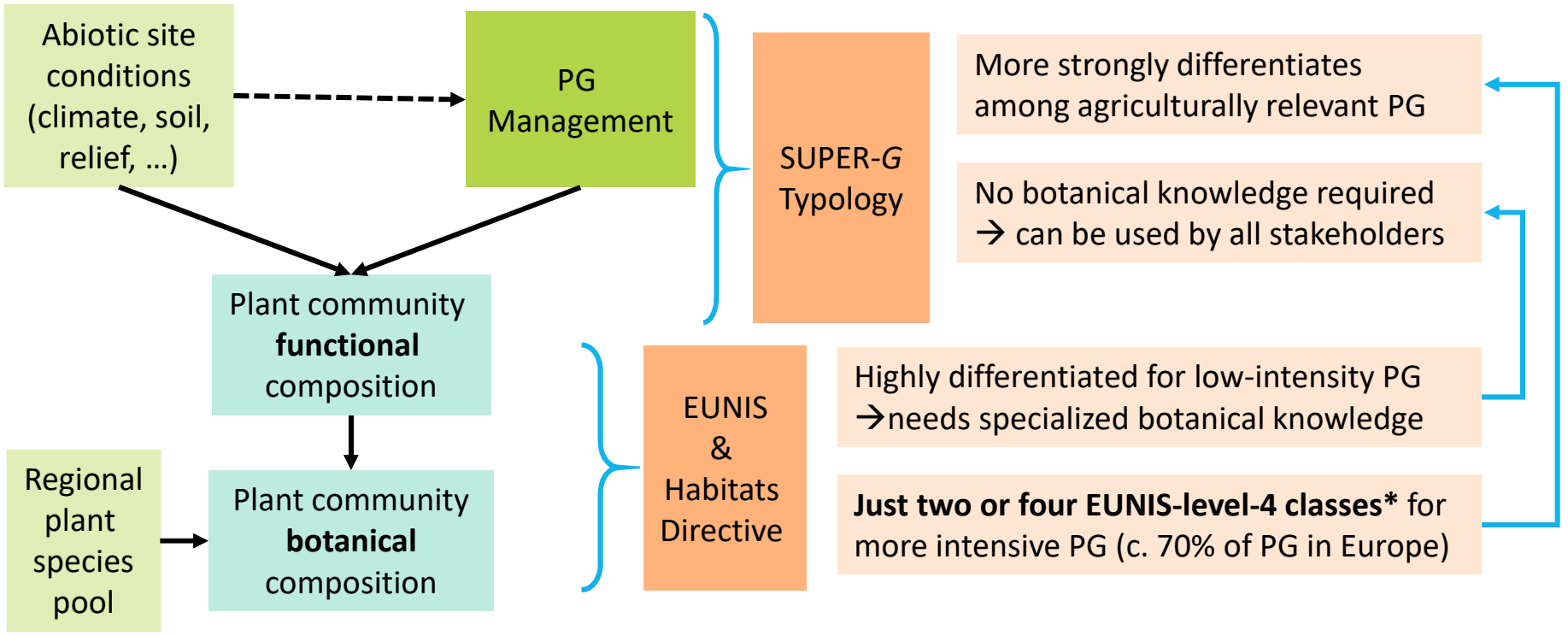
(Courtesy of Stanislav Hejduk, Mendel University)



PG typology


PG
Managed
Unmanaged (U)
Woody plants ≥ 10% (W)
Woody plants <10%
Renewal interval ≤ 15 y (S)
Renewal interval > 15 y
productive region
marginal region
High intensity (H)
Intermediate intensity
Low intensity
Productive region (IP)
Marginal region (IM)
Productive region (LP)
Marginal region (LM)
+ Additional attributes
Slope, stoniness, peat, season length, ...

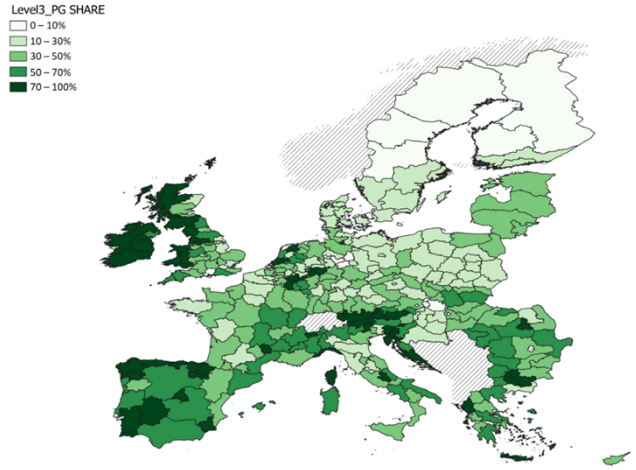
SUPER-*G* PG typology complements existing classifications



* E2.61 / E2.62 Agriculturally improved, reseeded and heavily fertilized grassland (dry-moist/wet)
[E2.11 / E2.12 Permanent mesotrophic pastures and aftermath-grazed meadows (unbroken/ditch-broken)]

T2.2 Sustainable PG farming systems

- What do we know about grassland-based farming systems in Europe?
- Farm accountancy data network (FADN) data
- Using a PG-based farming system classification

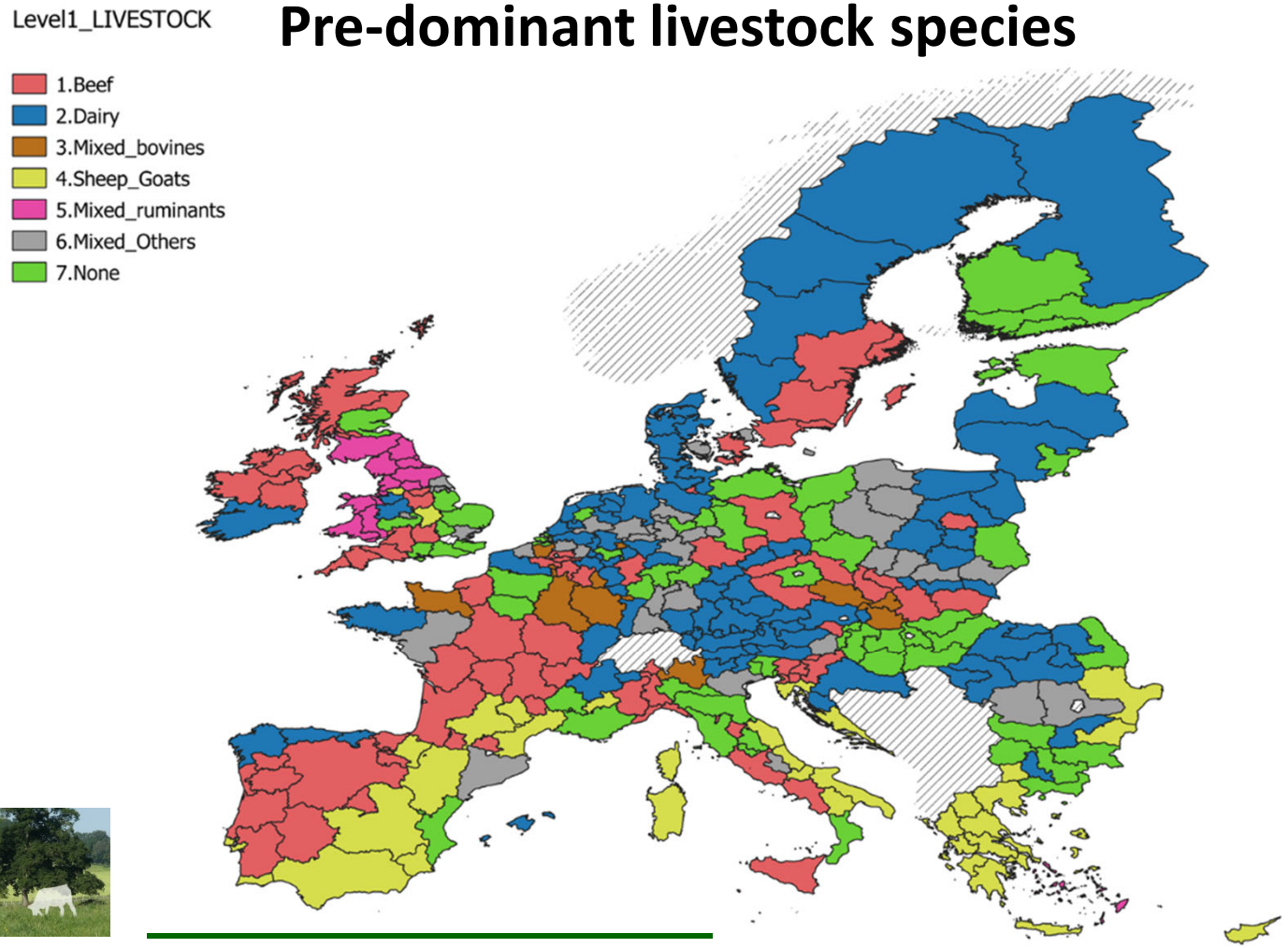


Classification of PG-based farming systems

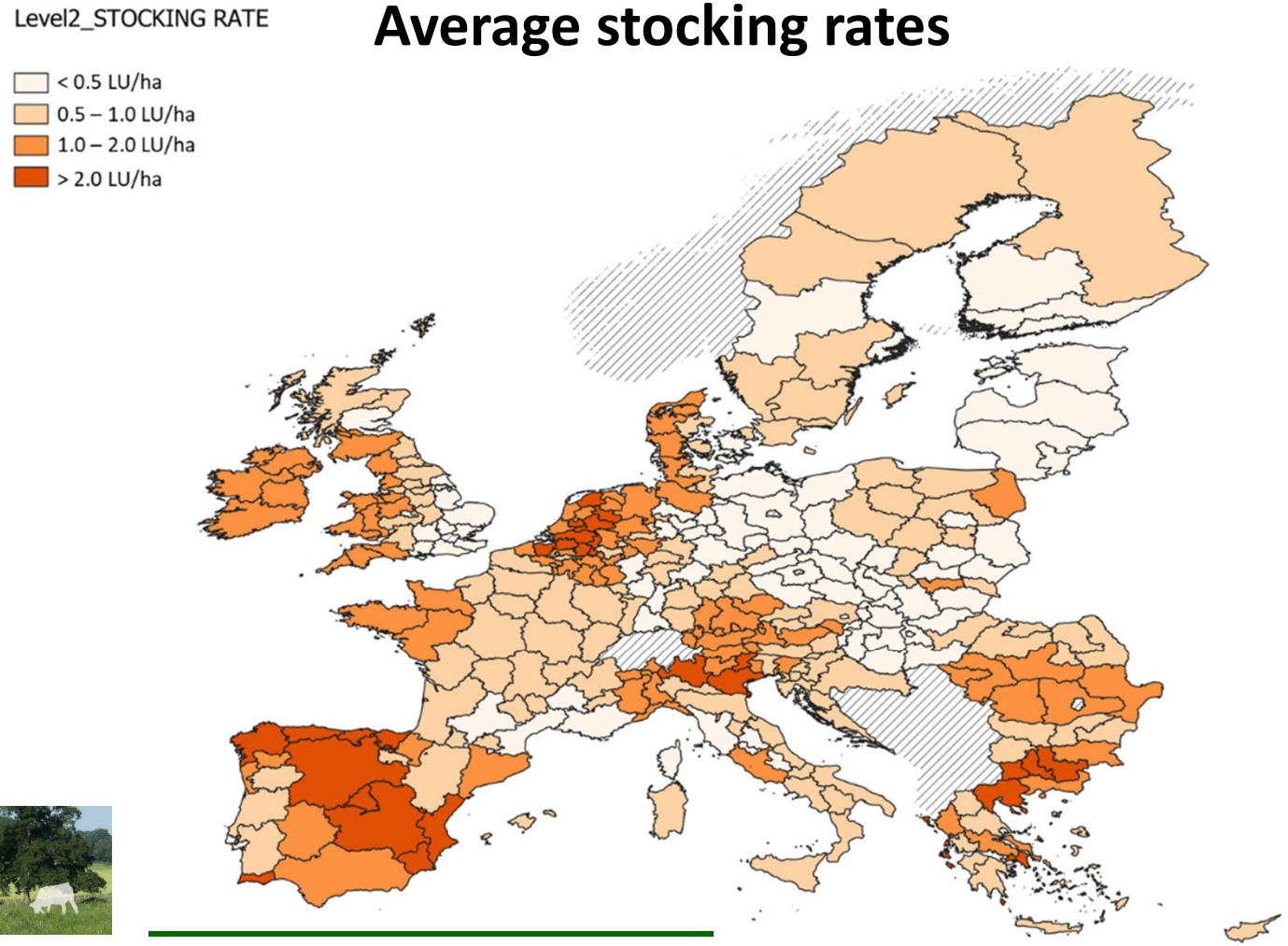
applied to FADN 2017 data

1st level	2nd level	3rd level	4th level
Livestock species (corresponding to >75% of LU on the farm)	**Stocking rate on total UAA**	**PG share on total UAA**	**Exploitation regime**
1. Beef cattle	1. <0.5 LU/ha	1. <10%	1. Predominantly grazing (>75% PG ha)
2. Dairy cows	2. 0.5-1 LU/ha	2. 10-30%	2. Predominantly cutting (>75% PG ha)
3. Mixed bovines	3. 1-2 LU/ha	3. 30-50%	3. Grazing & Cutting
4. Sheep &/or Goats	4. >2 LU/ha	4. 50-70%	4. Non feeding or Not relevant
5. Mixed ruminants		5. >70%	
6. Mixed Others			
7. None			

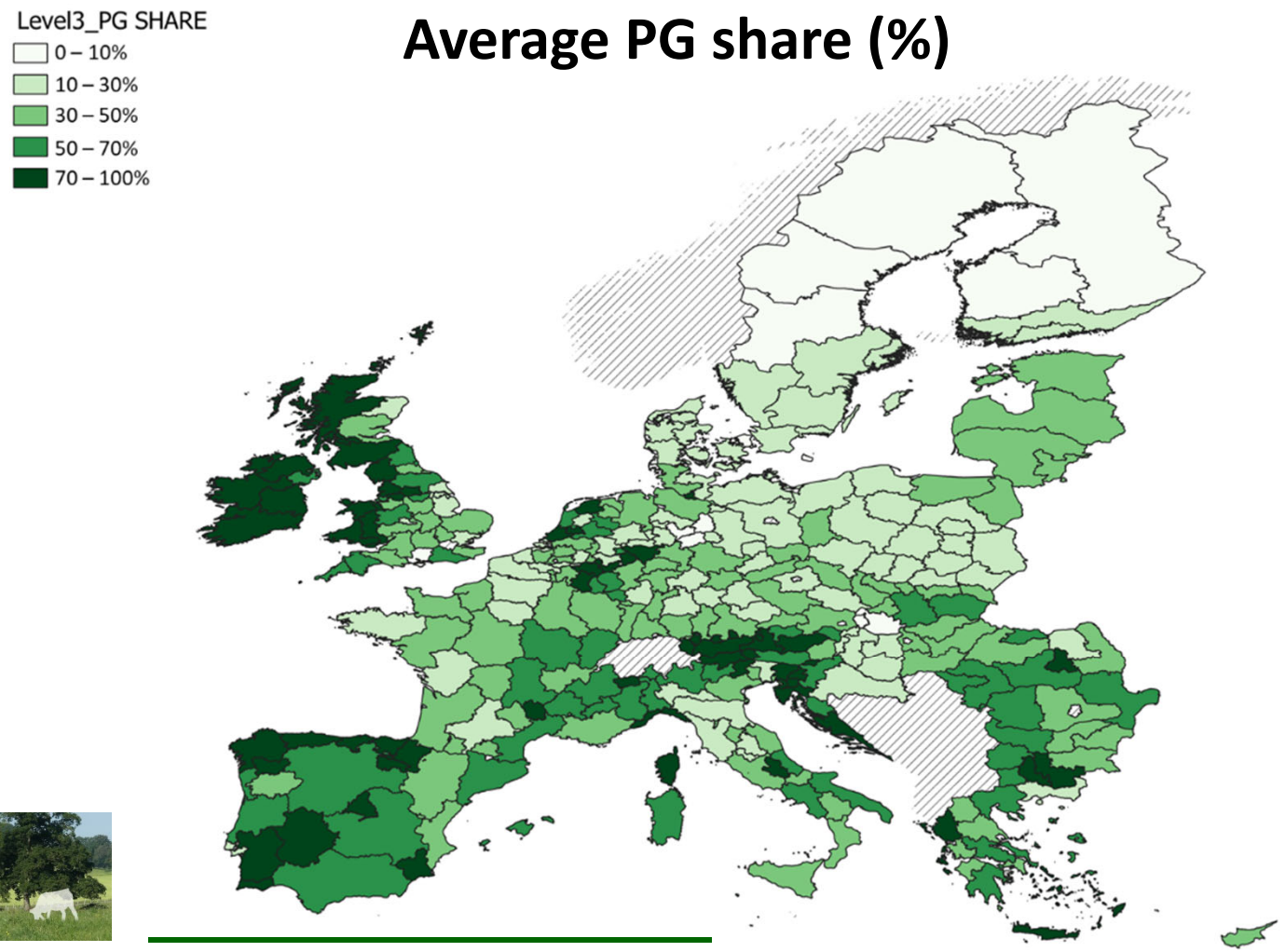
Pre-dominant livestock species



Average stocking rates

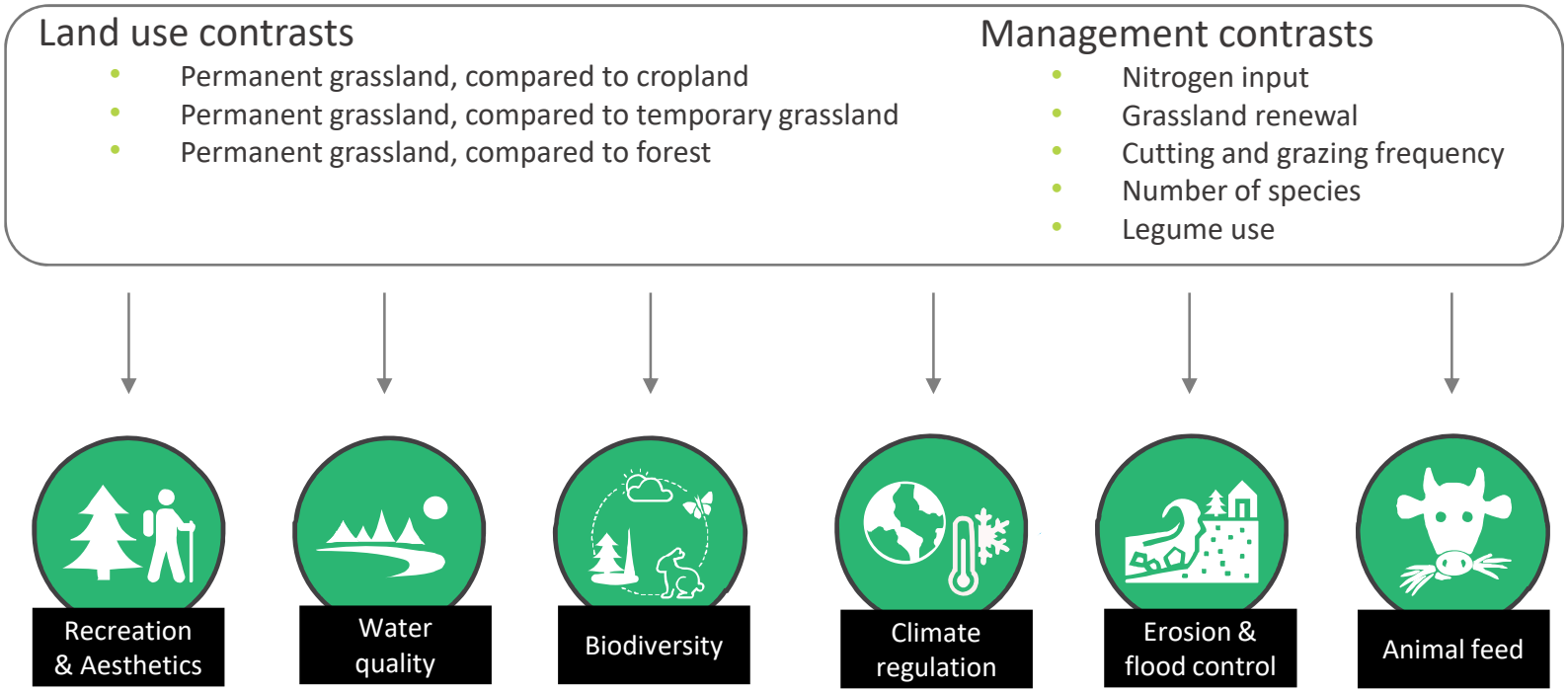


Average PG share (%)

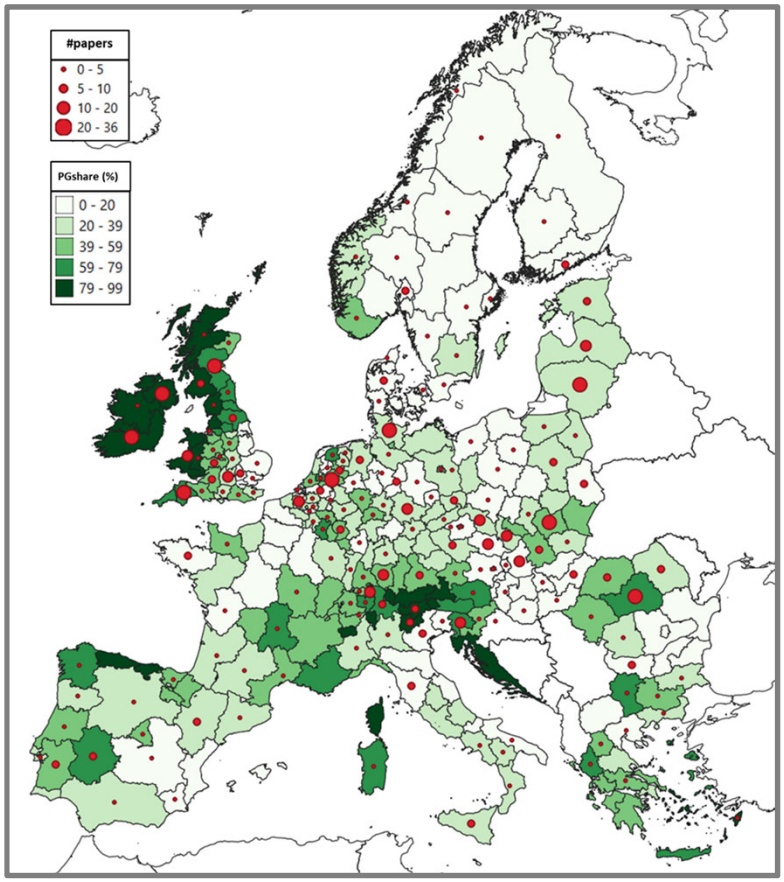


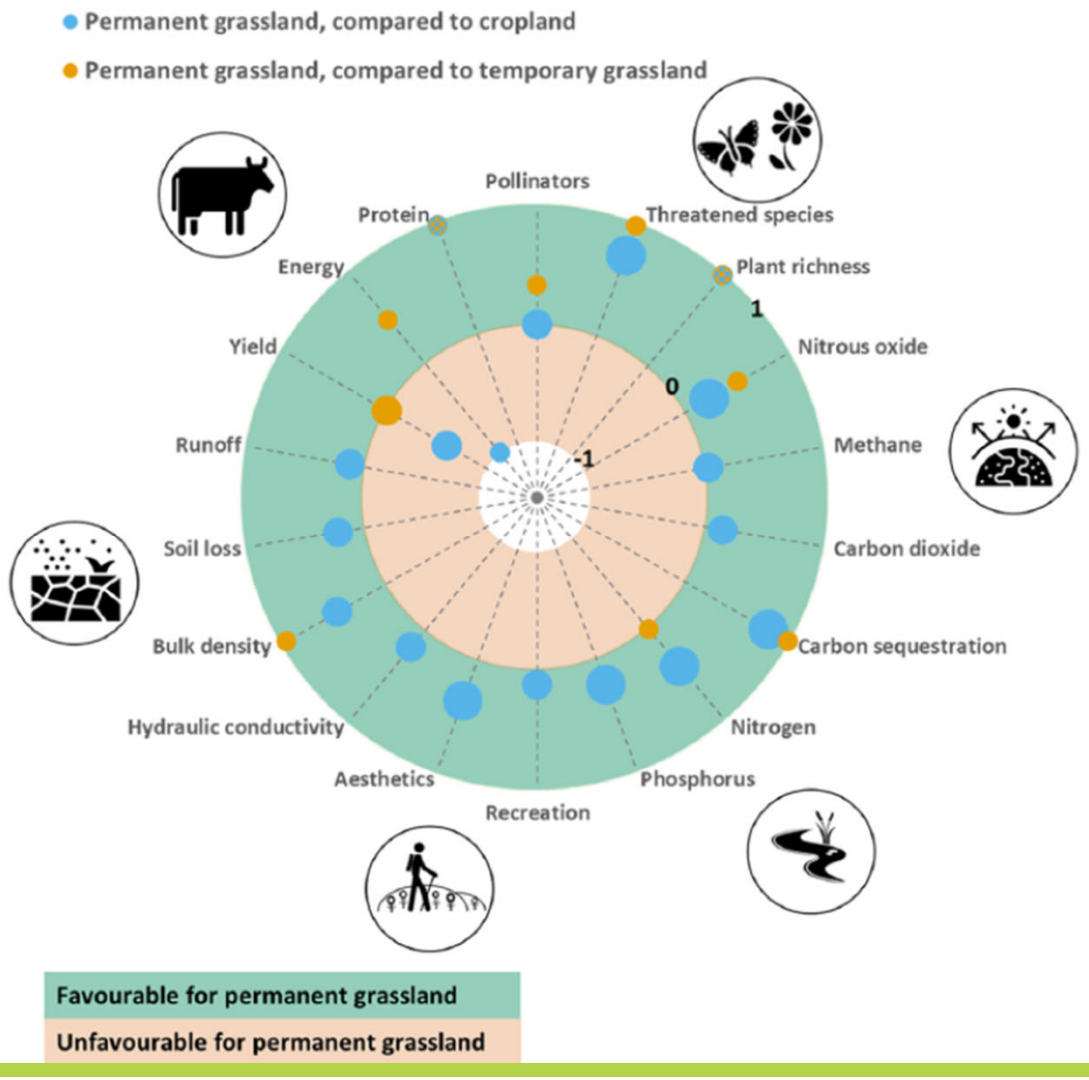
Land use and management effects on ecosystem services

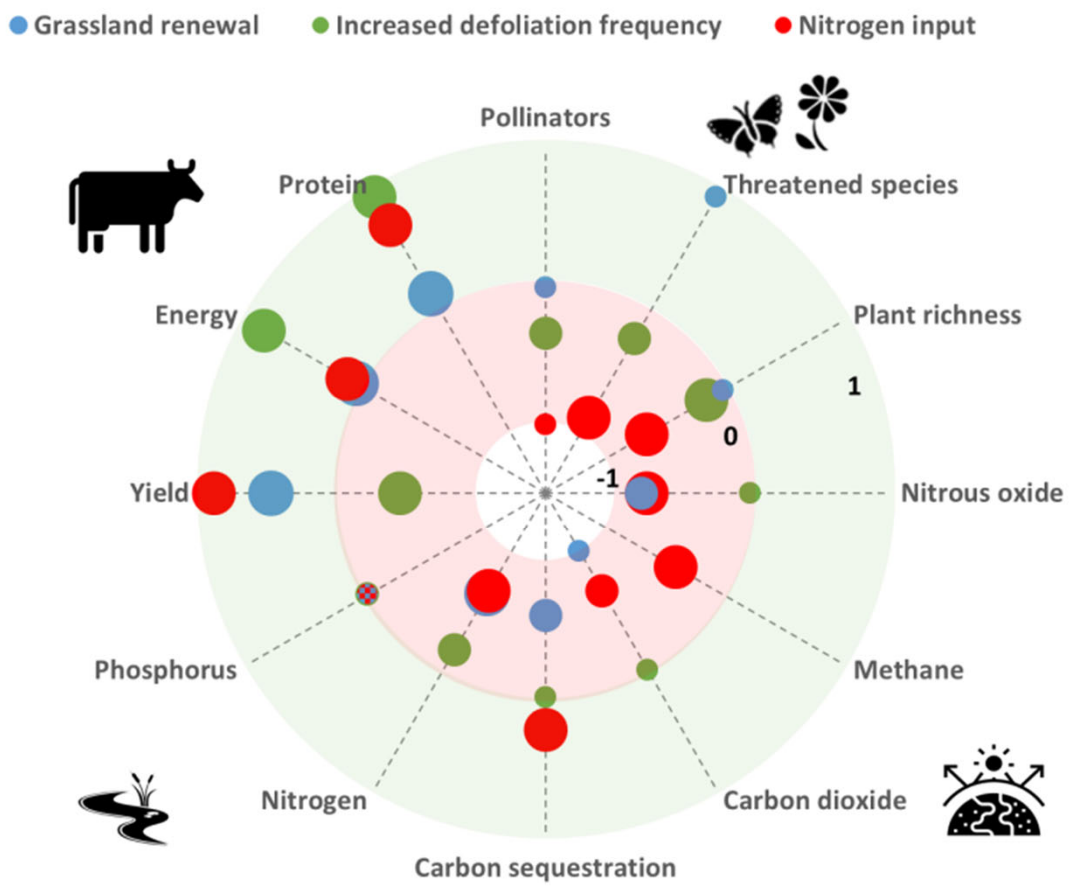
Systematic literature review into the reported effects



Extracted papers




Permanent grassland, compared to cropland
Permanent grassland, compared to temporary grassland
Pollinators
Threatened species
Protein
Plant richness
Energy
1
Yield
Nitrous oxide
0
Runoff
Methane
-1
Soil loss
Carbon dioxide
Bulk density
Carbon sequestration
Hydraulic conductivity
Nitrogen
Aesthetics
Phosphorus
Recreation
Favourable for permanent grassland
Unfavourable for permanent grassland



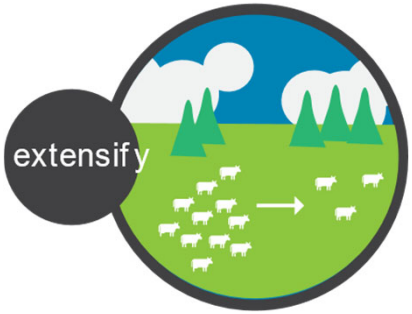
Favourable effect of management intervention

Unfavourable effect of management intervention

Systematic literature review conclusions

Multifunctional permanent grasslands increasingly important in the European food system

Protection needed to prevent further decline



Reduce management intensity on existing permanent grasslands

PG management challenges (responses from co-innovation farm workshops)

- Stony / wet / shallow soils
- Sloping land
- Sward composition
  - If/when to reseed?
  - What seed mix?
- Adapting to more extreme weather patterns
- Improving grazing management
- Weed control
- Cost/benefit of management interventions
- Improving the utilisation and nutritional quality of grass
- Length of tenancies
- Lack of incentive to retain PG
- Conflicts between productivity and ES such as biodiversity

PG management options 1

Management practice	Options
Use	Haymaking; silage; grazing; pollination; honey; edible plants; bioenergy-biofuel; none
Cuttings/grazings per year	1; 2; 3; 4-5; >5
Exploitation seasons	Winter; summer; autumn + spring; spring + summer + autumn; all year round
Grazing species	Cattle; sheep; goats; horses; deer; buffalo; reindeer; pigs; poultry; wild herbivores; mixed; none
Grazing pressure	Low (<0.3 LU/ha/y); medium (0.3-1.2 LU/ha/y); high (1.3-2 LU/ha/y); very high (>2 LU/ha/y); none
Grazing practice	Continuous extensive (free roaming); rotational; continuous intensive; shepherded; none
Grazing interval	Short (<21 days); medium (21-35 days); long (> 35 days)
Frequency of livestock movement	Every day; every 2-5 days; every 5-14 days; > every 14 days; not moved

PG management options 2

Management practice	Options
Overseeding	Regular (every 3-4 years); periodical (every 4-8 years); occasional (about every 8-12 years); rare; none
Lime use	Yes; no
Fertiliser type	Manufactured fertiliser; livestock slurry; farmyard manure; poultry manure; other organic manures
Fertiliser frequency	Occasional; regular (once a year); frequent (more than once a year); none
Manure spreading	Surface broadcast, trailing hose; trailing shoe; injected
Irrigation type	Sprinkler; flooding; fertigation
Irrigation frequency	Occasional (droughts); regular; none
Harrowing	Occasional; regular (every year); none

Diverse / multi-Species swards

- **Benefits include:**
  - Lower fertiliser use
  - Climate adaption (drought tolerance)
  - Improved Soil Health & Carbon Sequestration
  - Biodiversity benefits
  - Can be as productive as conventional swards
- **Challenges**
  - Different management skill set / farmer attitude needed
    - Incentive schemes need to include training / advice
  - Species persistence
  - Many knowledge gaps remain
    - 40 years of research on perfecting management of PRG swards
    - Further long-term institute and on-farm research projects needed

Virtual fencing

- Animal welfare considerations – ethical clearance
- Cost for farmers
  - Productivity benefits will not “pay” for the technology
  - Significant potential environmental benefits – environmental farming schemes need to adapt to support the use of such technologies (including significant capital costs)
- Who owns has access to the data?
- Can we put in fail safes to protect animal welfare?
  - Limit on shocks / maximum stocking densities
- Use of the technology will need guidance
  - Technology moving faster than policy

Task 4.2. Farmer preferences and priorities for ecosystem services in relation to PG (building on previous tasks)

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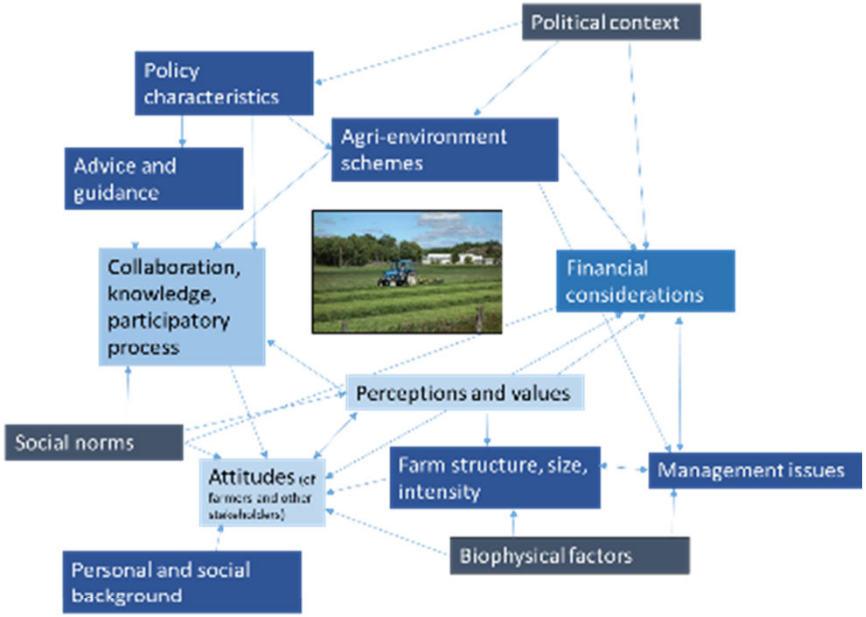
Task 4.1a Influences on farmer decision-making



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Task 4.1b Economic drivers of change in PG

- There is a high reliance on public payments from the CAP, with uneven impact in mitigating loss of PG and associated ES provision.
- Lack of literature regarding economic tipping points for change, and a need for future research to identify and map ES provision by PG along with trade-offs and synergies.
- There are substantive challenges to maintaining Europe's PG area and management, which cannot be addressed adequately through EU-wide instruments.

Attitudes to PG and ES delivery

- **Citizens** more likely to describe valuing **cultural services** including food, tourism, cultural heritage and landscape
- **Farmers** more likely to give importance to **provisioning** and **regulating** services, such as food production, erosion control and water regulation

(Tindale, 2019)

From interviews with 373 farmers in Czech Republic, Spain, Sweden, Switzerland, UK (*c*. 75 per country) in 2020-21:

- PG farmers:
  - generally **understand the environmental benefits PG provide**
  - **enjoy farming**
  - are **good at finding information** to help them run the farm business
  - believe it's important to **adapt and use new technologies**
- Farmers agree that PG are **important for delivering a variety of ES**, but the importance of ES varies between countries

Photos courtesy of SUPER-*G* photo competition.

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Future of PG management and maintenance: Opportunities and risk

- Ability to maintain PG land use and management, dependent on **future availability of subsidy payments (e.g. CAP), climatic conditions (requiring adaptation)** and **ability to make money within a struggling economy** (Spain, Czech Republic & Sweden)
- **Uncertainty of future agri-environment schemes** a barrier to increasing PG area for **biodiversity** and **carbon storage** (UK)
- Concerns around **climate uncertainty** and **extreme events** as well as the new **CAP,** and **succession planning** (Spain)
- Policy concerns related to **subsidy conditions, rule changes** and **limited support** (Czech Republic)
- Concern around **economic threats** and **land tenure** issues (UK and Sweden)

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Citizen’s attitudes towards grasslands and meadows (and sustainably produced food)

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3,184 participants from **Czech Republic, Spain, Sweden, Switzerland** and **UK**

Quota sampled on **age, gender, socio-economic group** and **rural versus urban residency**

- Most respondents viewed grasslands **as pleasant, good, valuable, interesting, beautiful and enjoyable** (positive affect)
- 27% of the respondents had either **negative or neutral attitudes to PG**
- The highest levels of **positive affect and behavioural intention linked to PG were associated with UK** respondents
- Respondents from **Spain and Sweden found it easy to identify sustainably produced food**, however, it was not a priority for them
- All countries, apart from Switzerland, showed an **intention to increase their consumption of foods that are sustainably produced**

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Summary

- Significant variation across Europe in farming systems based on PG
- Urgent need to assess the sustainability of grassland-based farming systems
  - Recognise and value the ES they deliver
  - Address urgent biodiversity and climate change mitigation and adaptation challenges
- Increasing support for low to moderate intensity grassland management could help protect PG, secure the provision of multiple ES, sustain rural communities and reflect citizens' interests
- SUPER-*G* will develop a set of policy options for PG that take account of farmer concerns and citizen's needs, identifying the key changes required around land use, PG protection and PG management

Thankyou!

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