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Managing grasslands for production environment and landscape benefit challenges at the farm and the territory level

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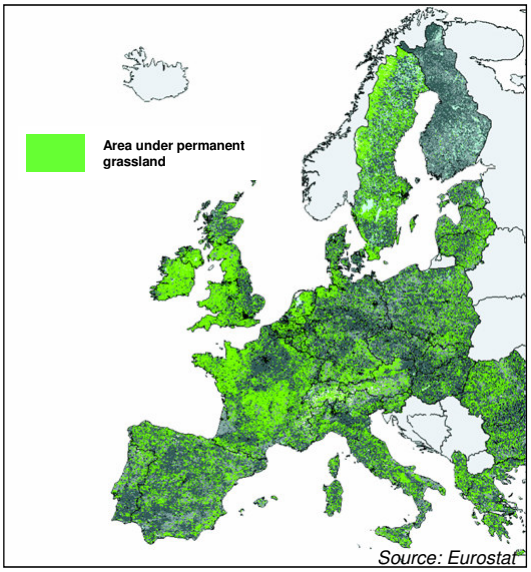
Permanent grasslands in Europe

- **EU15** (1995)
  35% UAA - 44.6 M ha
  Source: Eurostat

- **CEEC** (2000)
  selected countries

	Czeck Republic	Poland	Hungary	Slovak Republic	Slovenia
% UAA	22	19	15	35	65
Area (M ha)	*0.95*	*1.20*	*2.7*	*0.85*	*0.57*

Source: Habe et al., 2001; Gibon et al., 2003



Source: Eurostat

Managing grassland for production, environment and landscape benefit

challenges at the farm and the territory level

Introduction
- Current society and policy pressures on grassland and their management

I – Managing grassland for multifunctionality at parcel level
- Grass production
- Biodiversity

II – Managing grassland for multifunctionality at farm level

Conclusion

Current society and policy pressures on livestock production

⌦ Societal pressures
- Food security and safety
- Surplus production mitigation
- Consumer expectations natural – specific products
- Animal welfare
- Environment & landscape

⌦ Public policies
- Extensification
- Alternative systems (organic farming, …)
- Environment
- Landscape

Environmental expected benefits from grasslands

- Mitigation of water and air pollution / natural resource depletion (soil erosion,..)
  - Fertilisers & nutrient cycling
  - Preservation of soil, filter for pollutants, …
- Biodiversity conservation
  - Plant communities
  - Rare / patrimonial plant species
  - Habitats
- Mitigation of environmental hazards
  - Floods, fire risk, etc.

New expectations with respect to landscape the reflect in landscape sciences

- Past view
  - **visual outcomes** from the interaction between agriculture, natural resources and the environment
- **landscape multifunctionality**
  - an expression of the different functions of the "natural landscape"
  - society's material-ecological links between land use and land covers
  - the policy scene for problems related to competing and complementary types of land use
  - a theatre for aesthetics, social communication and conflicts and cultural interpretation
  - ***an all-encompassing system***

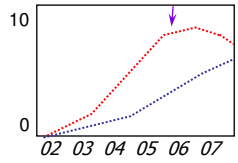
Source: Brandt & Vejre, 2003

Managing grassland at parcel level

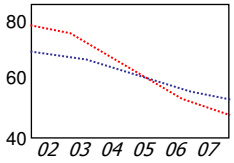
Grassland diversity and grass production

- Diversity of vegetation communities
  - species composition ⇔ production yield and patterns (grass quantity & herbage quality)
- Diversity of grassland cropping patterns
  - Number of harvests per year and variety of harvest practices
    - Grazing - *variety of grazing management patterns (continuous, rotational, etc.)*
    - Cutting - *variety of harvest timing & modalities (silage, hay making)*
- Complexity of grass production processes
  - Grass growth x soils fertility x fertiliser application
  - Interactions animals x vegetation at grazing
  - Nutritive value of grass (grazed grass & herbage crops)

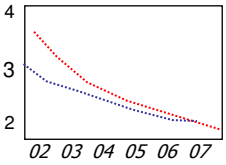
Dynamics of grass production in Pyrenean grasslands during spring growth cycle



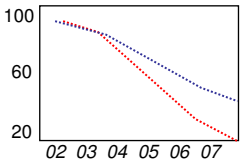
Grass crop yield (t DM/ha)



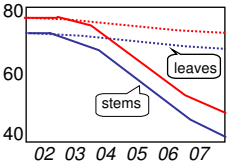
Grass digestibility (% OM)



Nitrogen contents (% DM)



Proportion of leaves (% DM)



Digestibility of leaves and stems (% OM)

"intensive" meadow
"extensive" meadow
non limiting mineral nutrition conditions

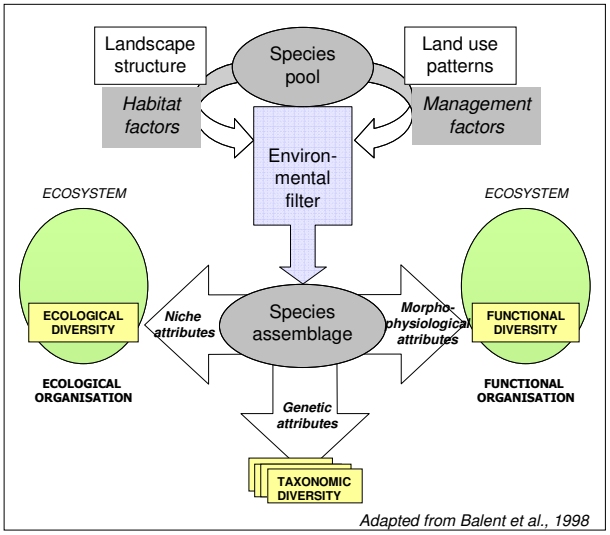
Source: Duru et al, 1997

Grassland diversity and biodiversity

- Rare plant species
  - a question of habitat
- Vegetation communities
  - a question of species assemblage
  - A question of vegetation succession
- Habitat for fauna species
  - a question of landscape organisation
  - a question of sward condition at specific stages of the annual cycle

➥ ***Strong impact of grassland management***

Determining factors of plant species assemblages



A broad overview of the relationships between vegetation & management practice

	Vegetation composition	Soil nutrient cycle	Grass crop annual yield
Dynamic equilibrium management adapted to vegetation and natural environment conditions	Stable (resilience)	balanced	Sustained
Over-use Insufficience of soil nutrient level with respect to crop yield	Move towards less productive grassland communities	Depletion of soils nutrient reserves	Decrease with years
Under-use Insufficience of crop yield with respect to soil nutrient level	Invasion with shrub and trees	conservation of soil nutrient reserves	Decrease with years
Over fertilising	Move towards "intensive" grassland communities	Change in soil nutrient reserves and supply	Increase with years

Managing grassland for multifunctionality at farm level

Policy regulations and their impact on farm management

- Increased contribution of grass and grazing in herd feeding systems
  - intensive livestock production
- Restrictions on strategy of farmland management at farm level
  - Extensification (stocking rates objectives)
  - Nutrient flows (fertiliser inputs and mineral nutrient balance objectives)
- Prescription of grassland management practices
    - delineated areas => management practice prescription

- A strong impact on management strategy
- A challenge for management practice
- A challenge for research

management practice restrictions & prescriptions
Research and development issues

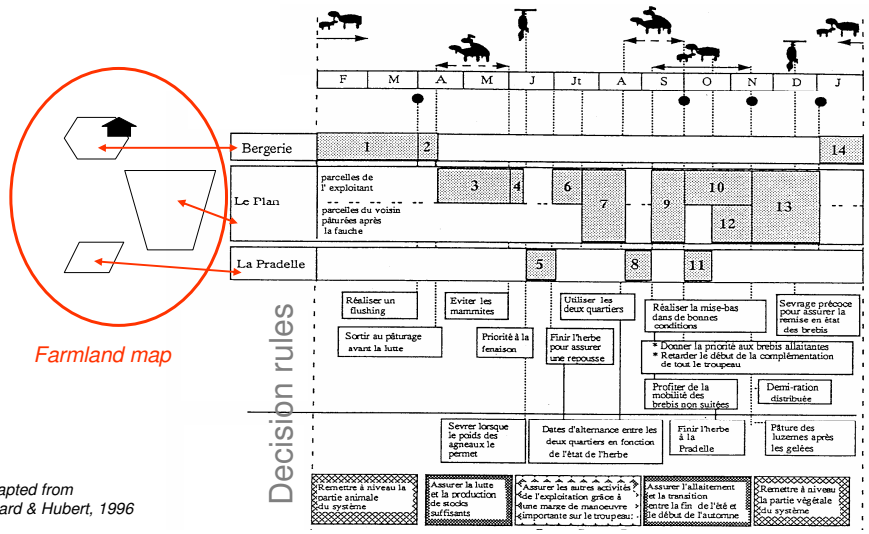
- Efficiency / environmental objectives
  - Adequacy
  - Long term impact

- Integration into sustainable farm management strategy & practice

economical impact

social liveability — technical feasability

The increased importance of the spatial arrangement of the farmland in farm operation

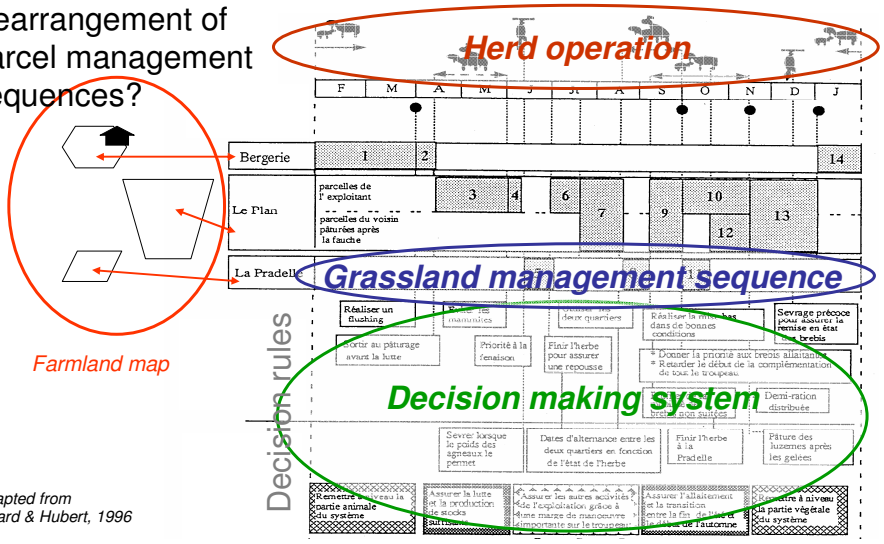


Farmland map

Adapted from Girard & Hubert, 1996

The increased importance of the spatial arrangement of the farmland in farm operation

Rearrangement of parcel management sequences?



Farmland map

Adapted from Girard & Hubert, 1996

Evolution in research approaches to grassland management

- Assessment and design of farm-level strategies
  - System experiments
  - Decision support models (management decisions and biological processes)
- Evaluation & understanding of farmer management strategies
  - Farm Monitoring
  - Participative research
    - System modelling of farm management

→ Major role of farmer decision making process

Managing grassland for multifunctionality the landscape point of view

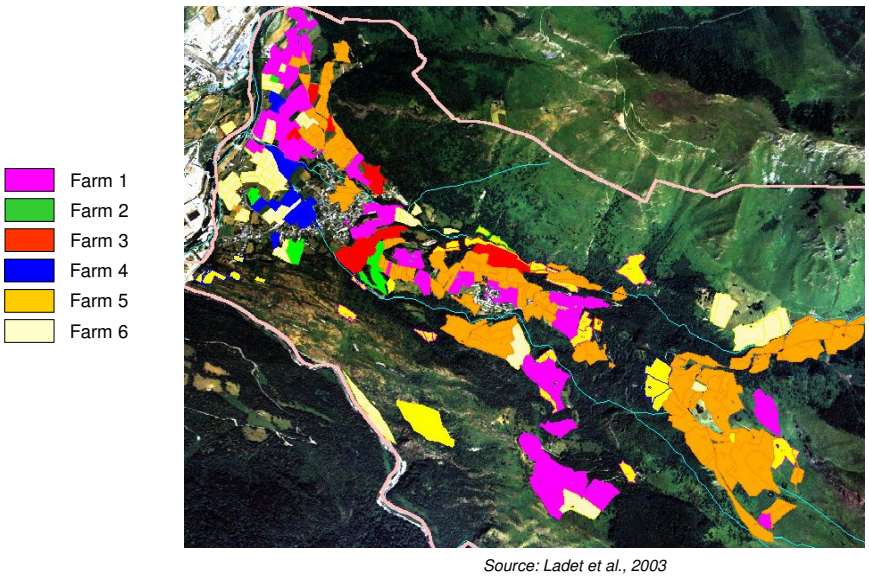
⌦Landscape functions and their change

spatial patterns of land use ⟺ spatial patterns of land cover

Farmland arrangement
Farmland use
Farming system diversity
Farmer strategy / farming styles

Long term dynamics

Spatial arrangement of farmland at the case of Villelongue village (Pyrenees, 2003)



Source: Ladet et al., 2003

Grassland management in the multifunctional perspective

- **Large array of concerns from the parcel to the region and from the short to the long term**
- **Complex relationships between multiple factors and processes**
  - interdisciplinary research
  - system approaches
  - field observation and case studies
  - renewed modelling effort
- **Major role of management practice relationships**
  - Increased scientific interest for farmer knowledge and skills
- **A change in researchers – farmers - public decision makers**
  - participative research / planning
  - Scenarios