Role of the between-plot plant functional diversity in uplandsdairy farms

Jean Pierre J. P. Theau, Mathilde Piquet, Bibiane Baumont, Christophe Chabalier, Benoît Delmas, Clémentine Lacour, Sophie Hulin, Anne A. Farruggia, Pascal P. Carrère

15th Meeting of the FAO-CIHEAM Mountain Pastures Network
Integrated research for the sustainability of mountain pastures

Role of the between-plot plant functional diversity in uplands dairy farms

Jean-Pierre Theau, Mathilde Piquet, Bibiane Baumont, Christophe Chabalier, Benoit Delmas, Clémentine Lacour, Sophie Hulin, Anne Farruggia, Pascal Carrère

Introduction

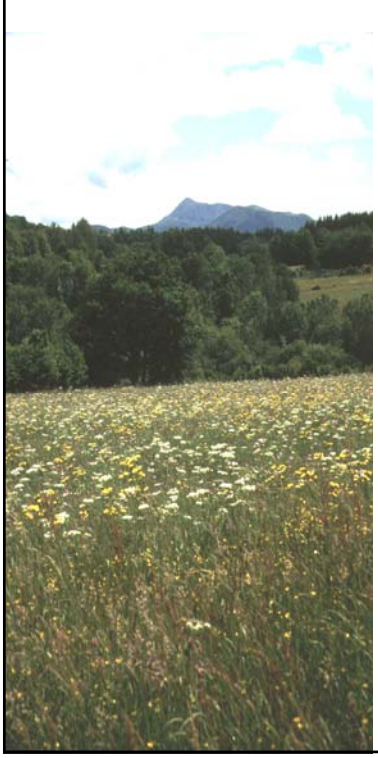
- Context

In upland areas climate or topography structure strongly influence farm systems.

- need to produce stocks to feed animals during winter season
- small or medium size structure with a scattered spatial organisation of the plots

- Issue

- Maintaining the economic viability of the farm requires to search **more favourable milk prices and profit margins**
- PDO = a good response to this issue + it sets grassland at a key point of the forage system



Introduction

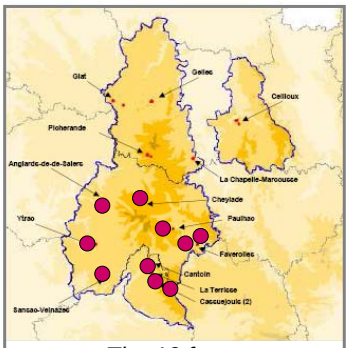
- The question
  - How can inter-plot diversity of grasslands on the farm be a positive feature in the sustainability of dairy systems ?
- The program
  - Research-Development project

Prairies Aoc

- Area and Process of the study
  - Massif Central
    ⇨ 2 PDOs:
    "Le Laguiole" and
    "Le Cantal"
  - Survey identifying farmers' practices
  - Botanic composition to assess the vegetation diversity of the plots

Material & methods

- Areas
  - Laguiole: 1,900 km², altitude from 700 to 1,300 m, average of 1,300 mm annual rainfall
    ⇨ 4 farms
  - Cantal: 7,200 km², altitude from 700 to 1,000 m, 600 mm to 1,600 mm annual rainfall
    ⇨ 6 farms



The 10 farms

- Representative of pedoclimatic variability
- Key figures of the 10 farms:
  - total cultivated area: 38-77 ha,
  - 27-50 dairy cows,
  - calving season: fall-winter,
  - intensification level:
    2,800 to 7,300 L/dairy cow
    2,400 to 6,500 L/ha of forage area

Material & methods

- Identification of farmers' practices
  - Vegetation survey
    - In every plot: contribution of **dominant species** = account for more than 17% of the botanical composition
    - according to Cruz *et al.* 2002, each species ⇨ **functional class**, defined by the dry matter content of blades

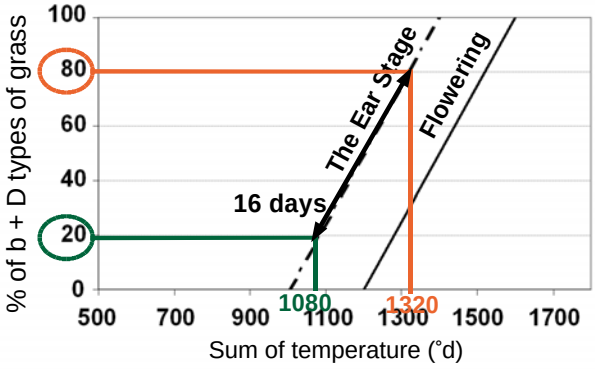
+ Phenology
+ Duration of leaf life
+ Digestibility at vegetative stage

Types	Species (examples)	
A	*Holcus lanatus*	Productive species
B	*Dactylis* sp.	
b	*Agrostis capillaris*	Late species
C	*Festuca rubra*	
D	*Brachypodium* sp.	
E	*Lolium multiflorum*	

From Ansquer *et al.*, 2004

Material & methods

- Identification of farmers' practices
  - Diagnosis of forage practices
    - Use phenology to diagnose quality of practices ⇨ mowing and grazing

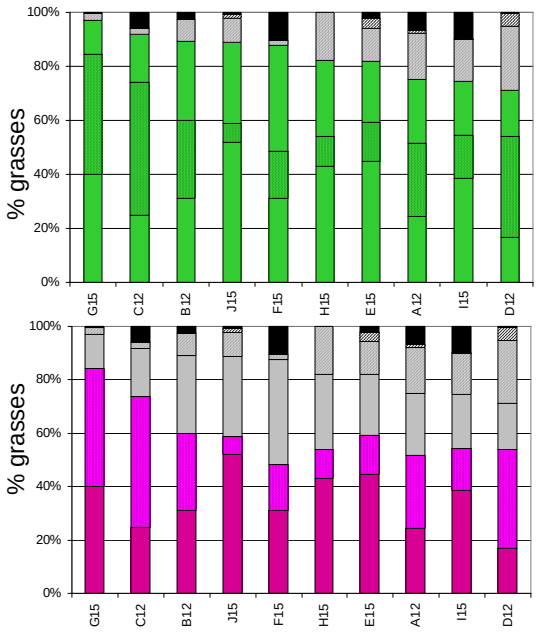


- Comparison of the diagnosis of forage practices to a reference table to estimate the quality of basis ration

Results and discussion

- Figure 1 : Part of each functional type in forage surface
- Figure 2 : Diagnosis of mowing production unit
- Figure 3 : Comparison of mowing and grazing practices with supplying of concentrates

At farm scale, grassland vegetation is diversified, but with a wide range of potential of production…



In each farm, we described 4-6 different functional types that showed a good functional diversity

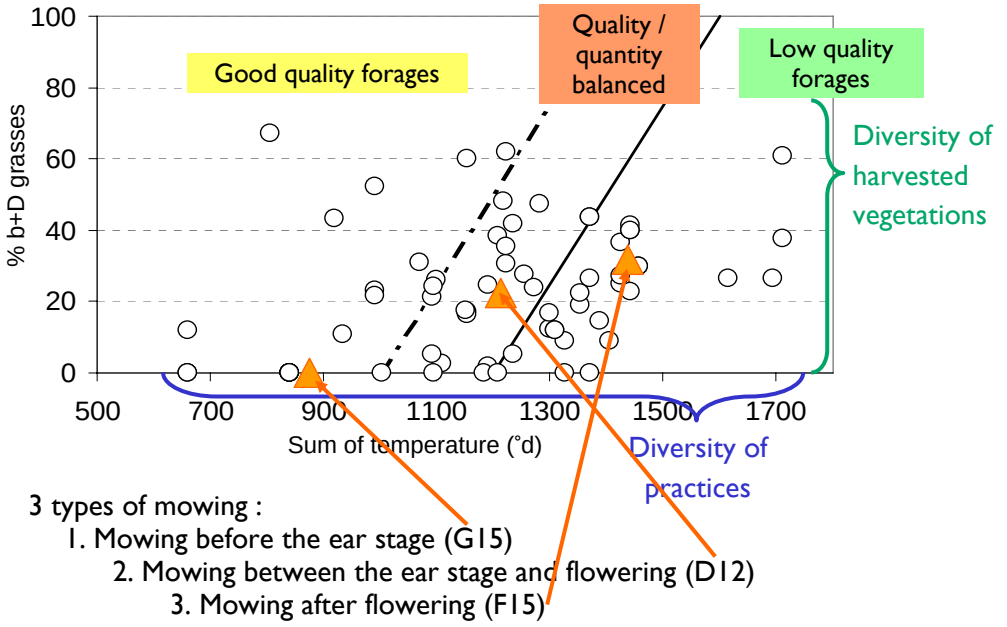
Productive grasses: 70 to 100 % of A + B + b types
⇨ varied productive potential

Among productive grasses,
50 to 85 % are early flowering species
⇨ varied precocity potential

… fexibility of management and autonomy in uplands farms

Figure 1 : Part of each functional type in forage surface

The functional approach allows a diagnosis of the farmer's practices



3 types of mowing :

1. Mowing before the ear stage (G15)
2. Mowing between the ear stage and flowering (D12)
3. Mowing after flowering (F15)

Figure 2 : Diagnosis of mowing production unit

Analysis of the system practices: identifying the part of mowing and grazing practices

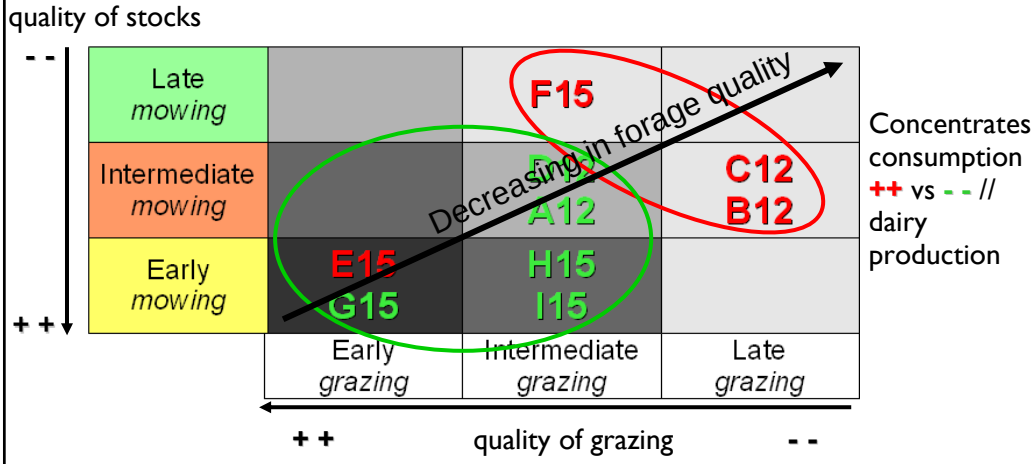
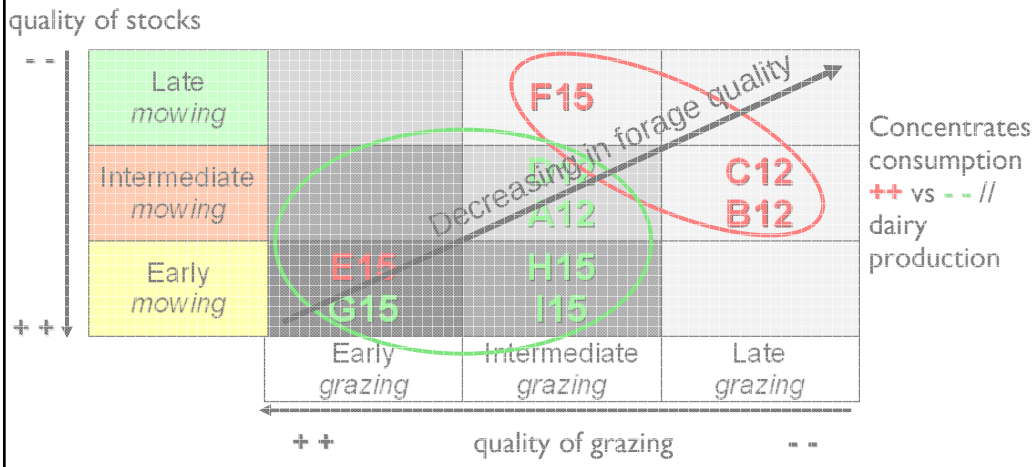


Figure 3 : Comparison of mowing and grazing practices with supplying of concentrates

Analysis of the system practices: identifying the part of mowing and grazing practices



lack of confidence of farmers in their capacity to efficiently manage grazing
⇨ **over consumption** of feeding inputs

⇨ grasslands are poorly managed … and farms are quite dependent on inputs
⇨ **economic weakness**

Figure 3 : Comparison of mowing and grazing practices with supplying of concentrates

Conclusions

- Our study shows that, in upland farms, forage potential of grasslands is under-used
- Reinforcing confidence of farmers in their grazing practices will let them to improve efficiency of dairy production units
- Such studies have to supply objective references to encourage grasslands use which provides sustainability

15th Meeting of the FAO-CIHEAM Mountain Pastures Network
Integrated research for the sustainability of mountain pastures

Role of the between-plot plant functional diversity in uplands dairy farms

Jean-Pierre Theau, Mathilde Piquet, Bibiane Baumont, Christophe Chabalier, Benoit Delmas, Clémentine Lacour, Sophie Hulin, Anne Farruggia, Pascal Carrère