Can cattle grazing maintain flood plain & peat grassland in the Biebrza Valley?

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Introduction

- Land use changes lead to abandonment of low productive meadows in the last decades

  (Bakker & Berendse 1999, Trends Ecol. Evol.)

- Traditional mowing regimes stopped
- Tall species are invading former semi-natural grasslands

⇨ Can grazing form an alternative to traditional management?

Management of semi-natural grassland

- Aim: Reducing dominant species and promoting target species and habitats
- Moderate grazing is recommended as an alternative to traditional mowing (Bakker 1989, Geobotany; Pykälä 2000, Conserv. Biol.).
- Grazing impact depend mainly on nutrient availability, soil moisture conditions and grazing intensity (Olff & Richie 1998, Trends Ecol. Evol.; Stammel et al.2003, Appl.Veg.Sci)

Study area: Lower Basin of Biebrza river valley

High productive

Low productive

Question

Terrain use and potential impact of cattle grazing in these 3 edaphic zones:

Site 1: Mineral flood plain ⇔Peatland

Site 2: Peatland ⇔ Hillock

Site 1

Mineral flood plain

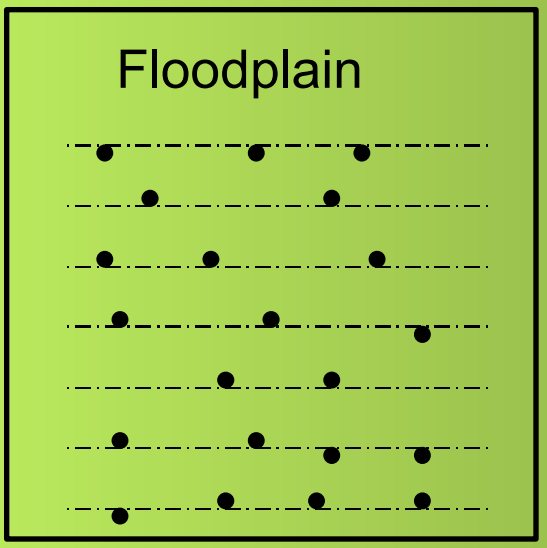
⇳

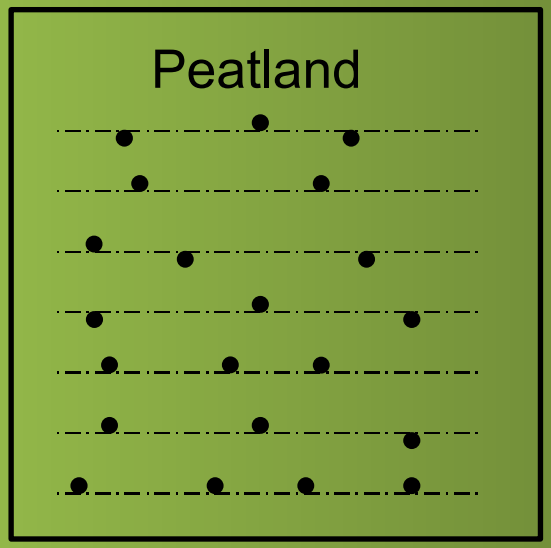
Peatland

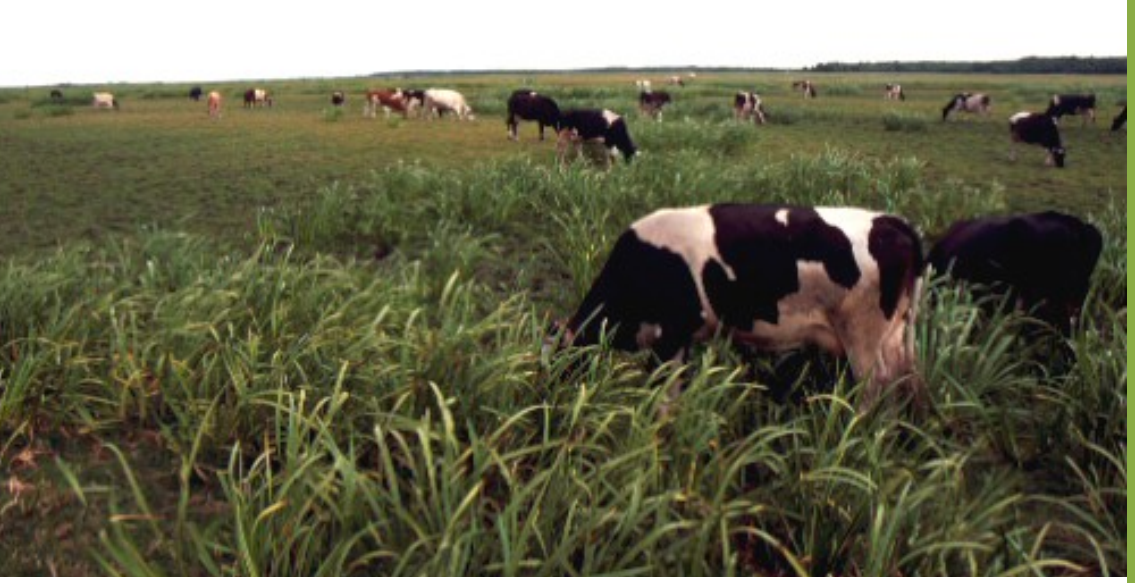
- Unfenced summer grazing
  - 140 diary cattle on ~300 ha
  - Limited to day
- Target species
  - MFP: Meadow birds
  - P: Short sedge communities

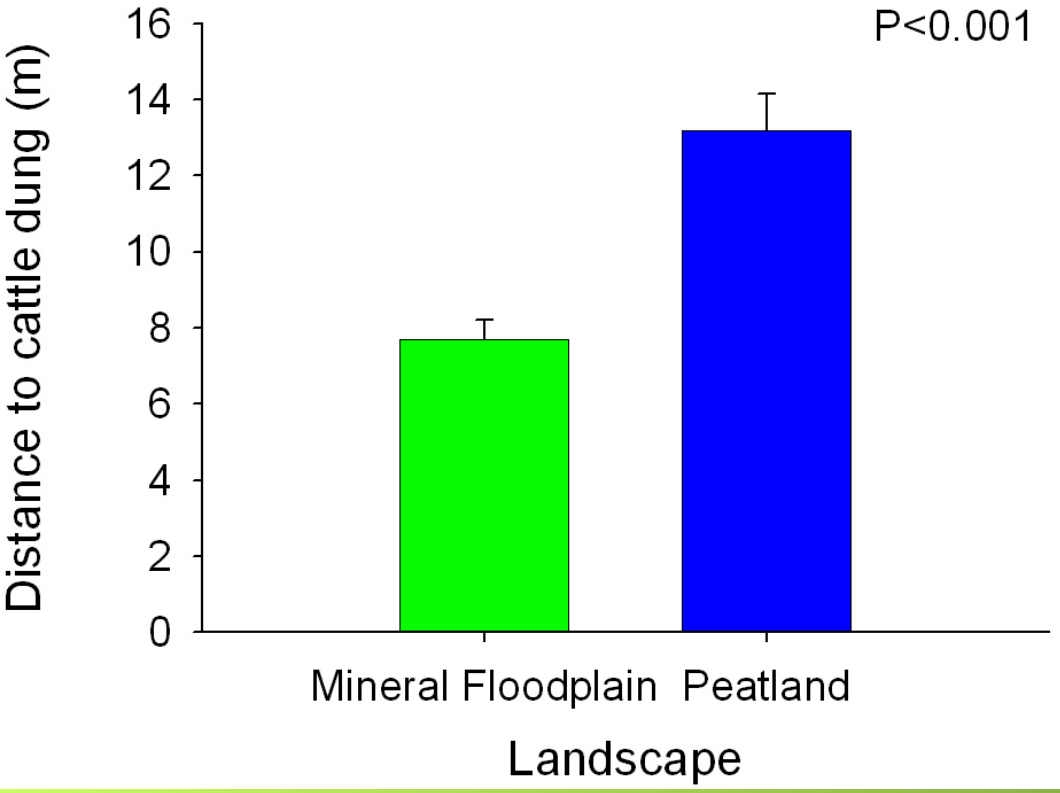
Method

- Indirect observation method
  - Distance to nearby cattle dung
  - Stratified random plotless sampling in Mineral floodplain and Peatland
  - Sample size:
    - Mineral Floodplain: n:81
    - Peatland: n:74
- Data analysis
  - Mixed models









- **Density is 3 times higher in Floodplain than Peatland**
- **Estimate stocking rates:**
- Total area: 0.8 cattle/ha
- MFP-area: ~1.2 cattle/ha

  (D = 260 dung/ha)
- P-area: ~0.4 cattle/ha

  (D = 87 dung/ha)

Conclusions Mineral flood plain ⇔ Peatland

- Use of cattle grazing is 3 times higher in Mineral floodplain than Peatland
- Reaching targets?
  - **MFP**: Critical meadow birds (e.g. Ruff) can have a maximum stocking rate of ~1 cow/ha (Beintema & Müskens, 1987, J.Appl.Ecol)
    - ⇨ Stocking rate on Floodplain grassland meets a desired level but may not increase!
  - **P**: Moderate stocking rate in nearby Peatland is reached

Site 2

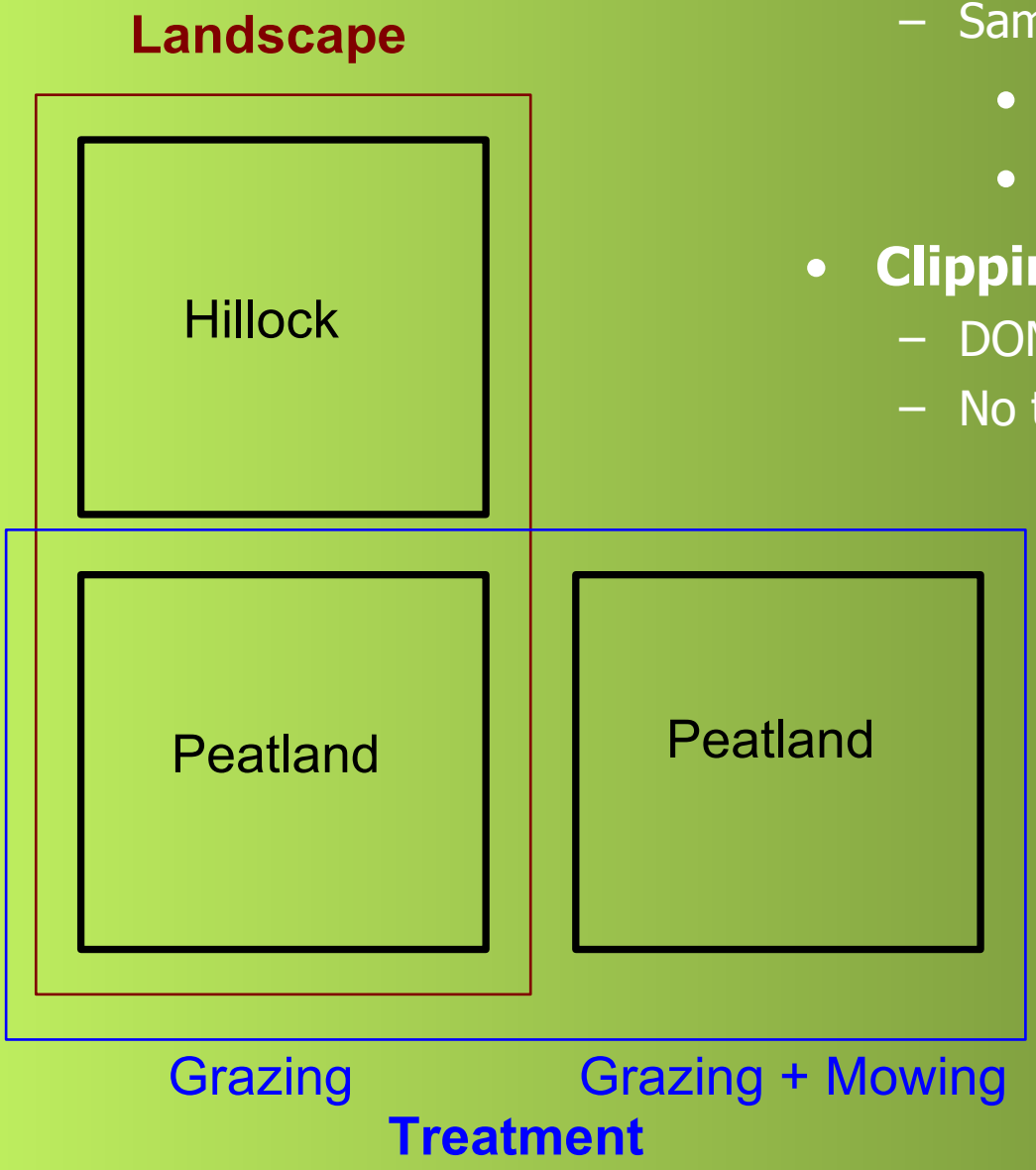
Peatland

⇕

Hillock

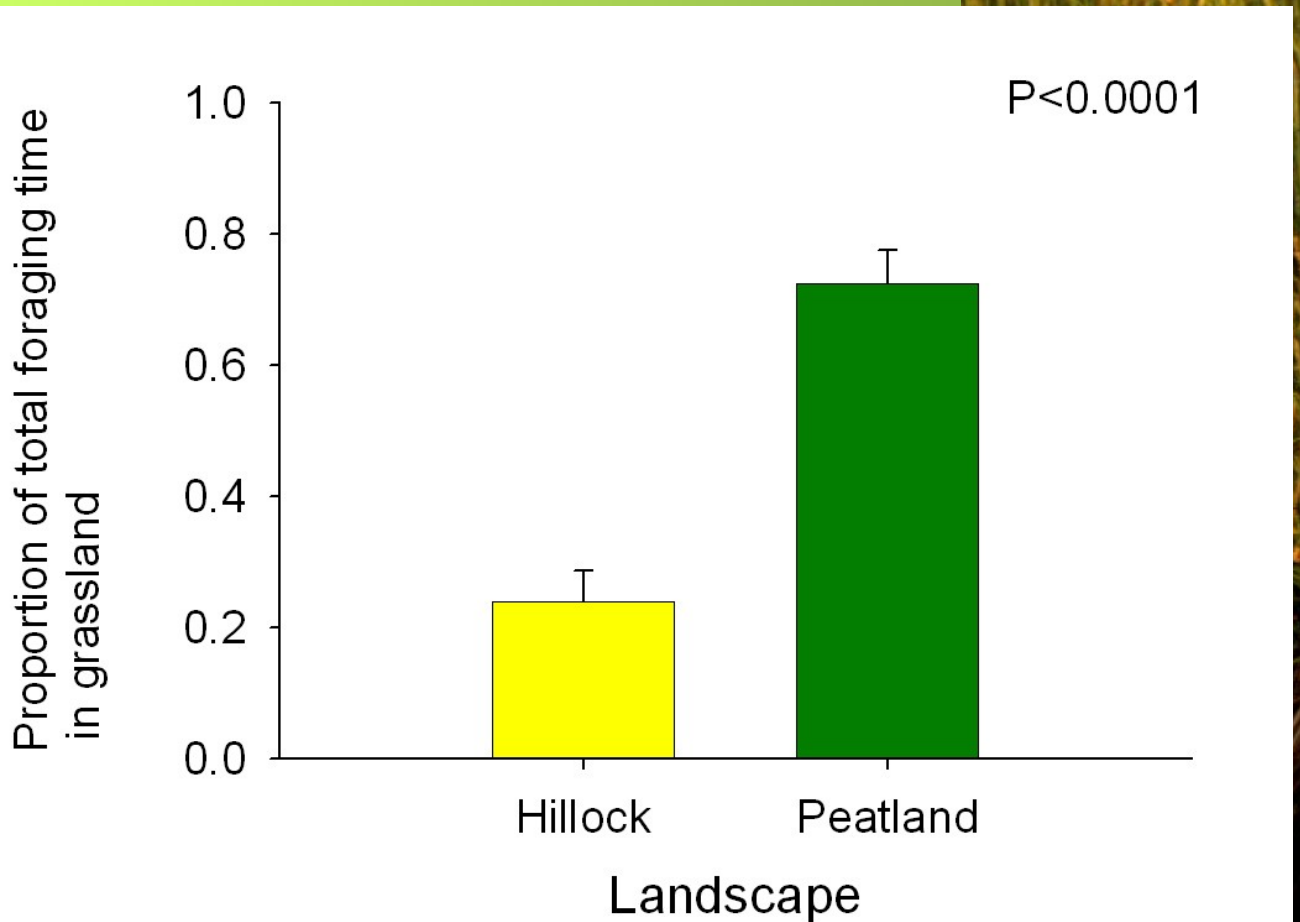
- Unfenced grazing in summer half year
  - 25 diary cattle (~300 kg) in home range of ~ 800 ha
- Low productive meadows on nutrient poor soils
  - Low fodder quality and nutrient availability
- Target habitats and species:
  - **P**: Short sedge communities
  - **H**: edge of hillocks with e.g. a number of Orchids (*Cypripedium calceolus,…)*

Method



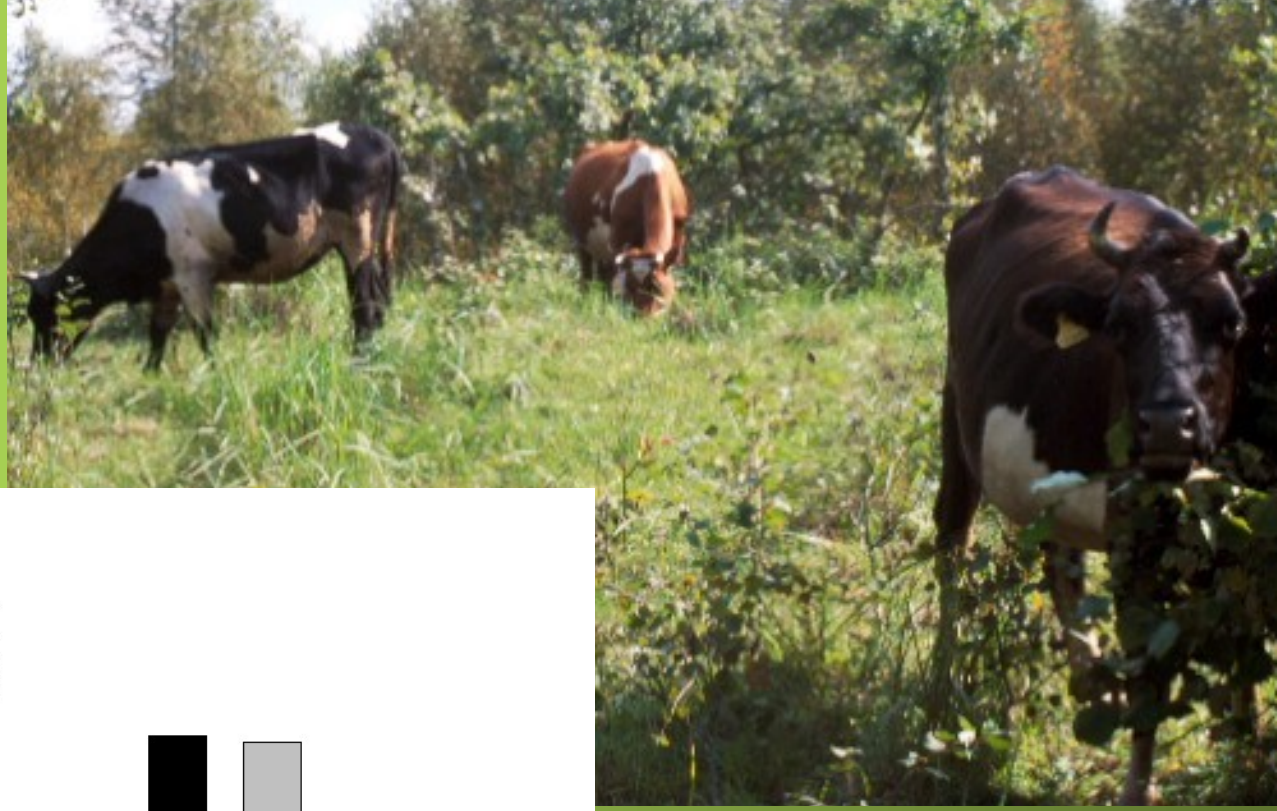
- **Direct observation method**
  - Sampling unit = Foraging bout
  - Sample size
    - Landscape n : 28
    - Treatment n : 46
- **Clipping experiment**
  - DOM, mineral nutrients (N,P,K)
  - No treatment *vs.* mowing
- **Data analysis**
  - Mixed models
  - ANOVA

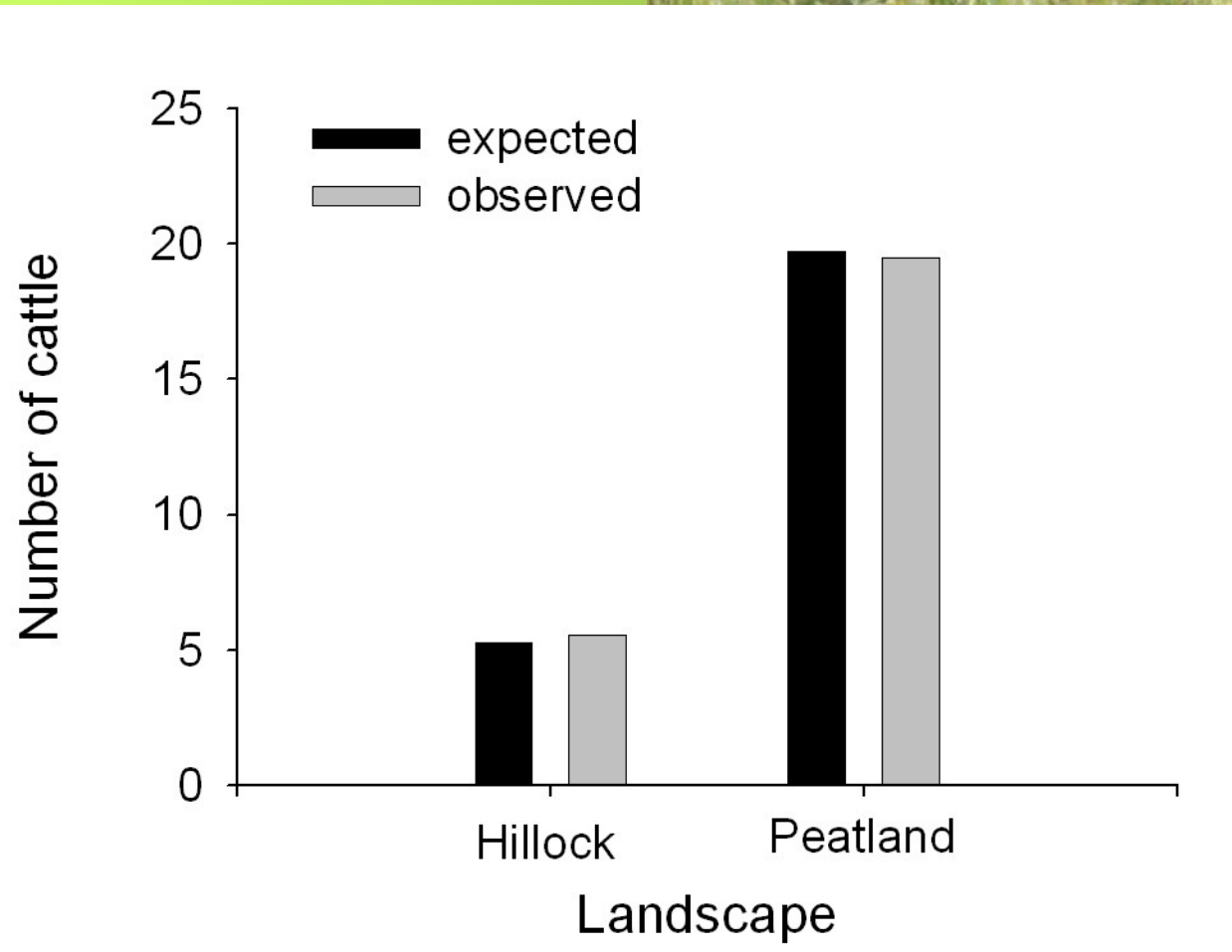
Peatland
⇕
Hillock



- Mean prop.
  - Hillock 24%
  - Peatland 72%

Impact on the landscape



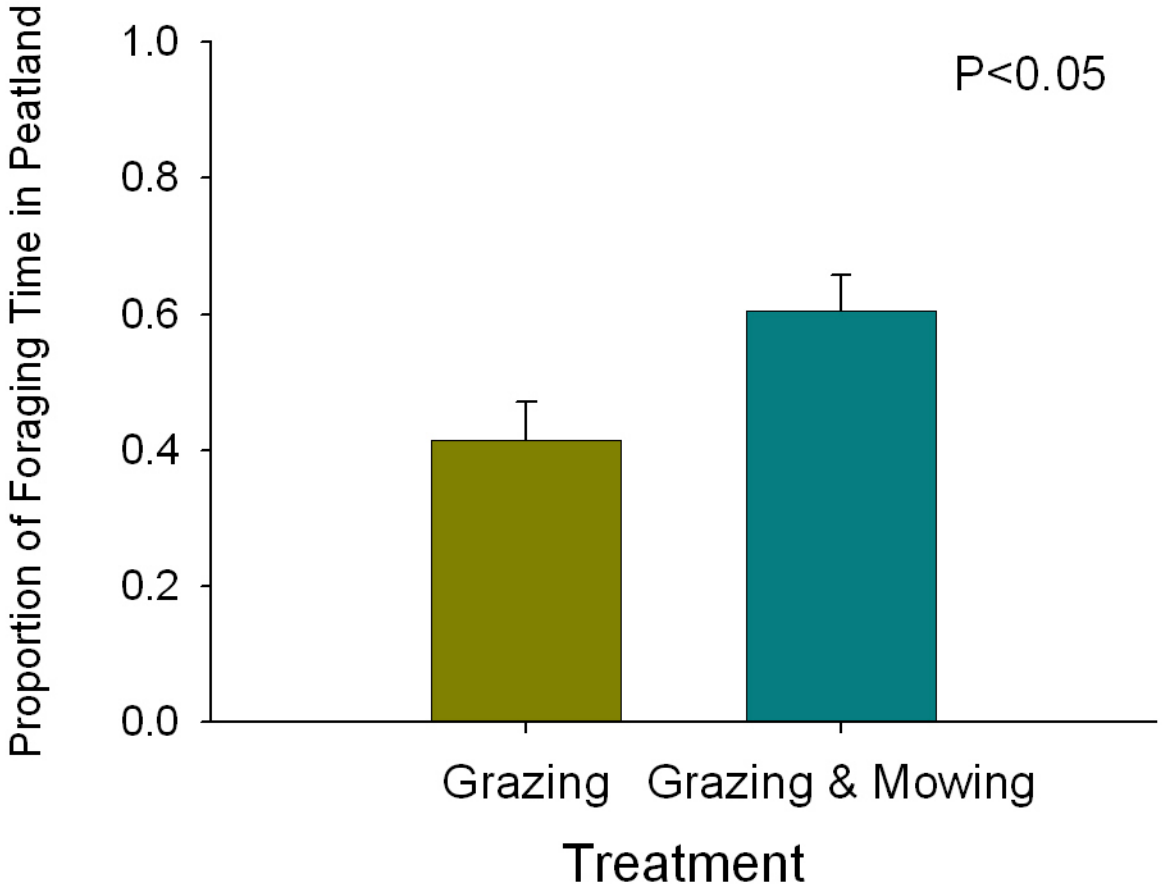


- Hillock *vs.* Peatland
- available area
  - Hillock : 170ha
  - Peatland : 635ha
- Hillock ≈ Peatland

Reaching targets?

- Present stocking rates on peat grasslands are too low
- Increasing stocking rates?
  - ⇨ Uniform spreading of grazing impact
  - ⇨ Risk of negative effects on hillock edges
- Other options:
  - Late mowing (Stammel et al. 2003, Appl. Veg. Sci.)
    - +Species diversity is higher on late mown fens than on grazed ones
    - – Repression of dominant species is less

Grazing ⇕ Grazing & Mowing

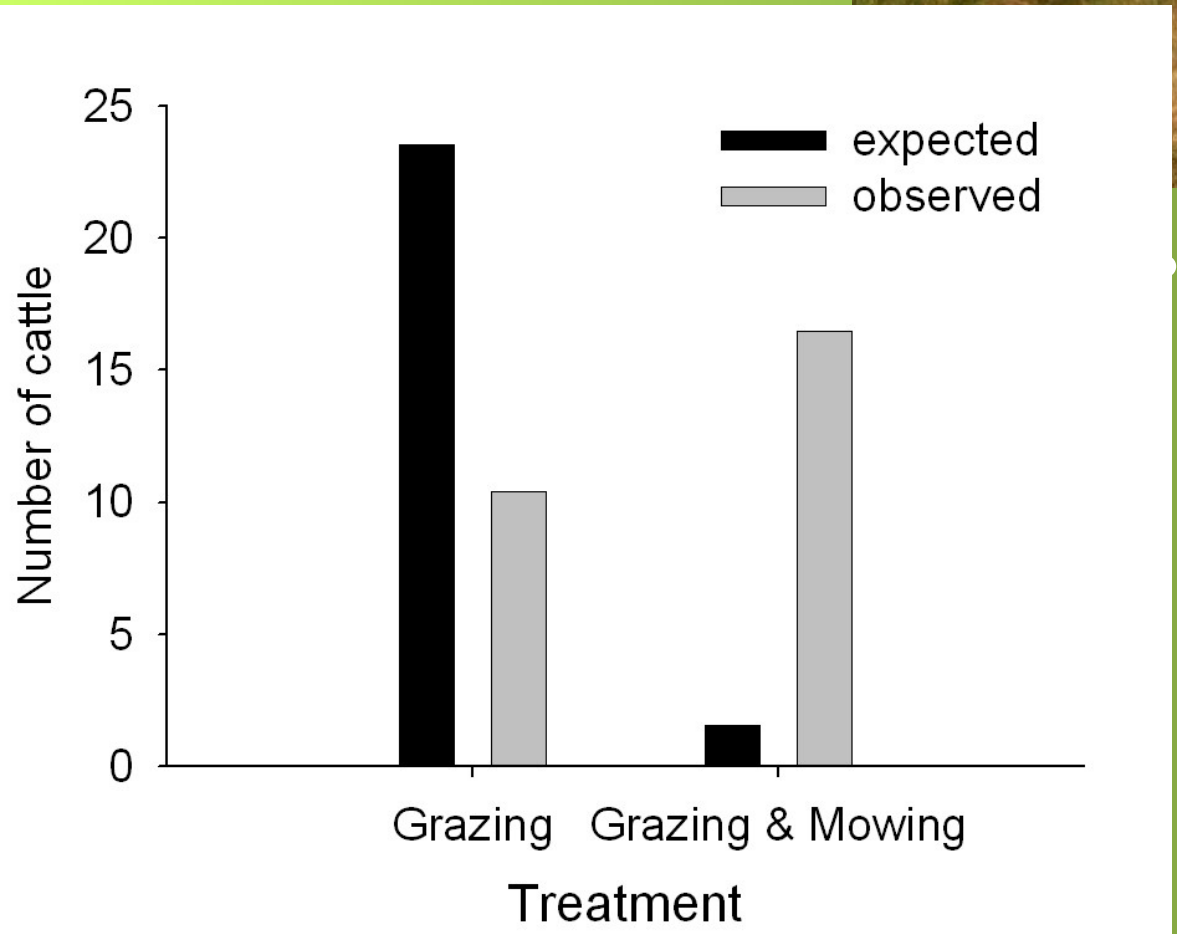


Foraging in short peat grassland

- Grazing: 42%
- Grazing + Mowing: 66%

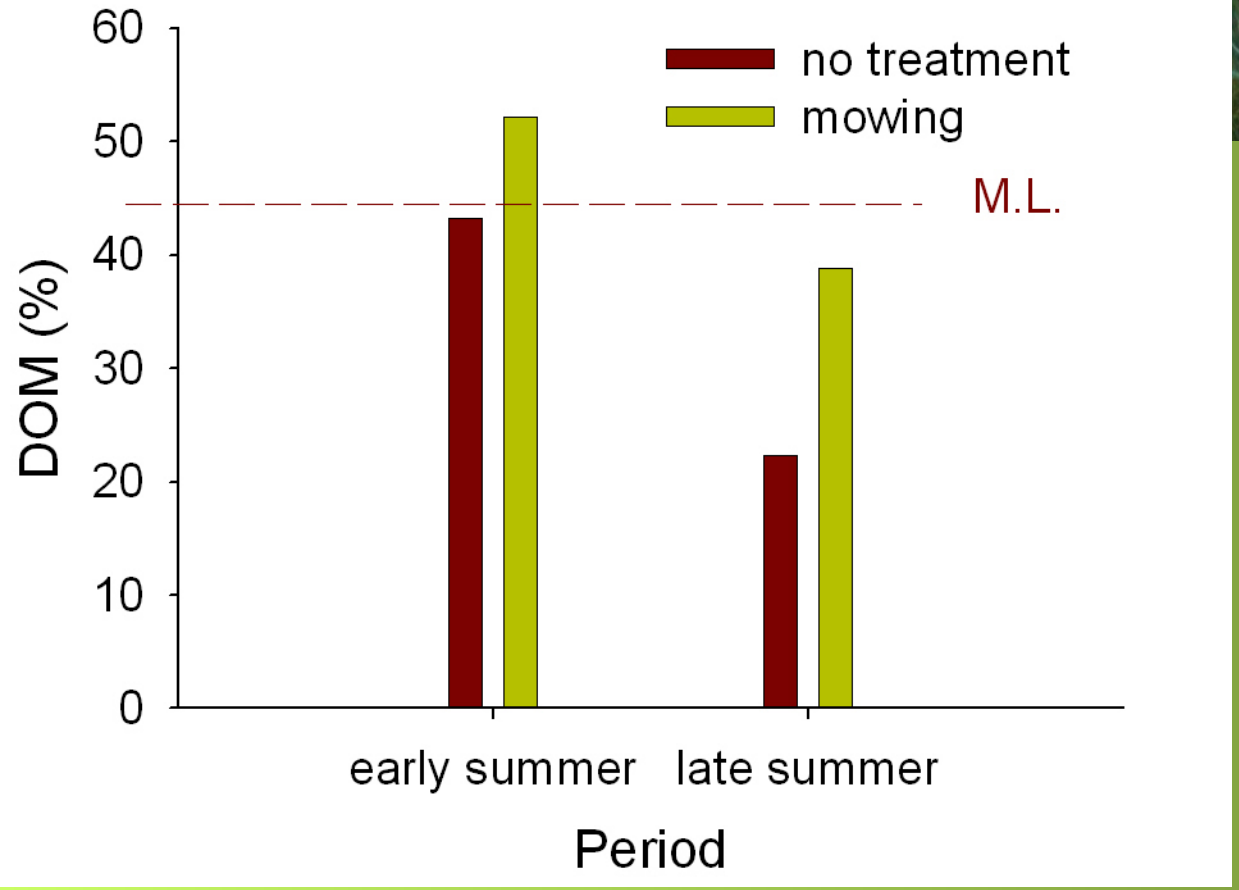
=> Increase of 24%

Impact of additional mowing



- Grazing *vs.* Grazing + Mowing
  - available area
    - G:595 ha
    - G+M: 42 ha
  - Grazing << Grazing + Mowing
    - G: 0.02 cattle/ha
    - G+M: 0.4 cattle/ha

Period of mowing



- Consequence of late mowing
  - Increase of digestibility
  - Increase of cattle performance

* M.L. = maintenance levels of grazing cattle (Van Soest 1982)

Conclusions
Peatland ⇔ Hillock

- Equal grazing impact on peat- and hillock grasslands
- Local mowing as tool to increase grazing impact in peat grassland
  - ⇨ Diminishing influence on edges of dry hillock
- Late mowing (August) can increase cattle performance and overall species diversity

Conclusions

In high productive landscape

- Cattle grazing is highly recommended for its target species and adjacent habitats

In the low productive landscapes

- Impact of cattle is similar for hillock and peatland
- Additional late mowing increases grazing on peatland and shield hillock edges from too intensive grazing