Management intensity and biodiversity conservation: is farm size the key?

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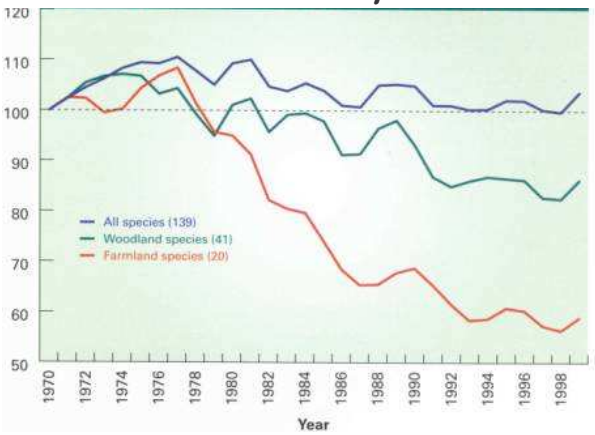
WHY matter about intensity & farm size for biodiversity conservation?

Important Bird Areas ● classified as threatened by agricultural intensification

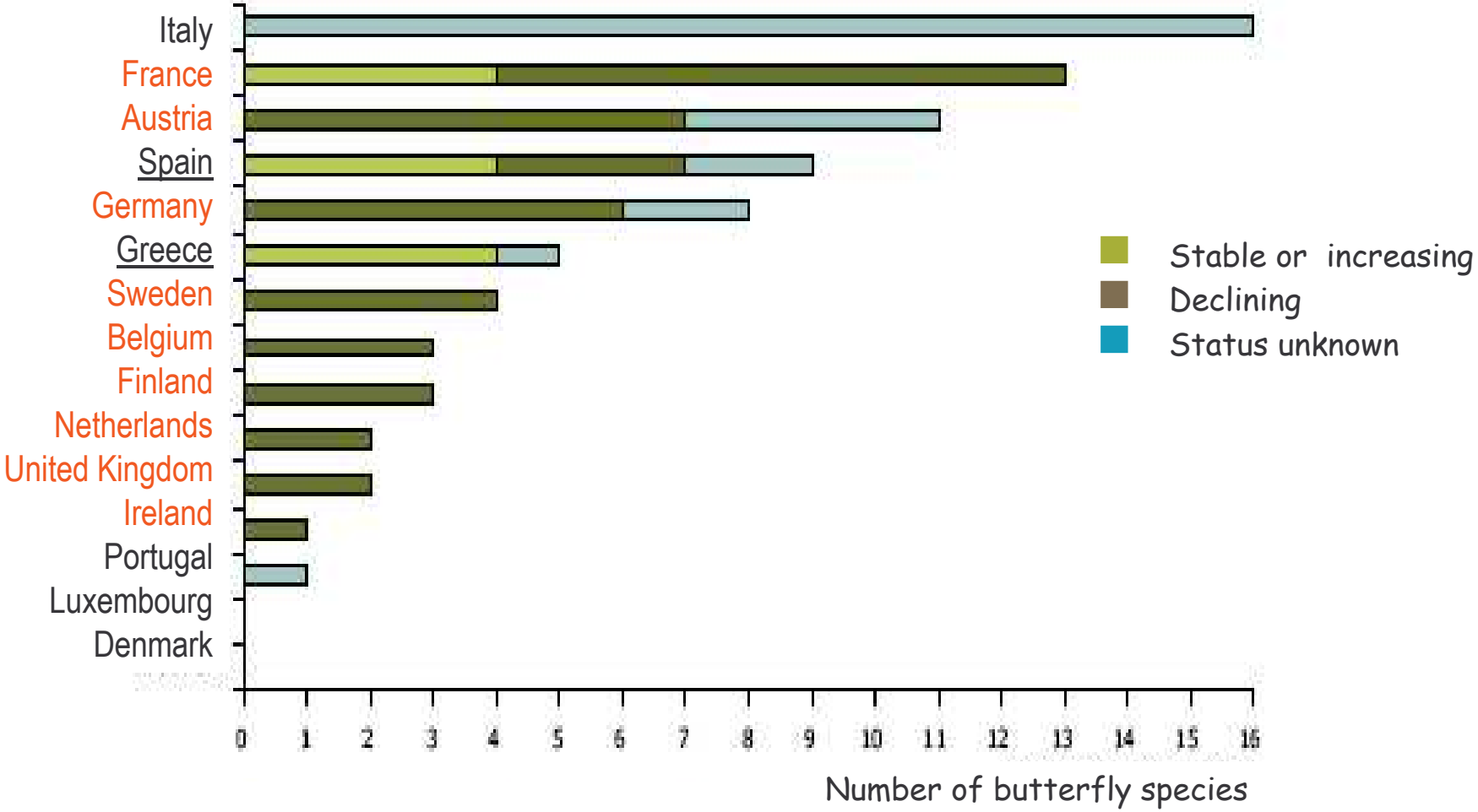
From EEA (2005) Agriculture & environment in EU-15 – The IRENA indicator report

Trends in bird species



Gregory et al. 2001

Population trends of butterfly species



From EEA (2005) Agriculture & environment in EU-15 – The IRENA indicator report

WHY matter about intensity & farm size for biodiversity conservation?

- Debate and controversial results:
  - Large farm manage the land more intensively (EU 1999)
  - N input, LU, overall intensity index… -> not correlated with farm size (Herzog et al. 2006) (Roschewitz et al 2005)
  - Management practices X farm size affect biodiversity (Belfrage et al 2006)
- But only a few studies in grasslands…

Our question:

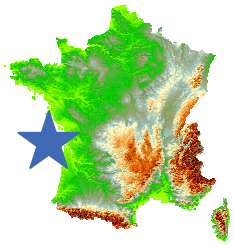
The FLOSS debate : a Few Large Or Several Small

Are small farms more efficient for biodiversity conservation?

Outline:

- Data set, hypotheses
- Farm & management diversity
- Farm clusters and management intensity -> biodiversity
- WHY size matters ?

Data set:



46 farms: structure, intensity & cattle numbers, economic size..

593 fields of permanent grasslands mowed and/or grazed: stocking rates, N fertilisation..

252 mowed and grazed fields: sward, stocking rates, fertilisation, bird presence..

Farm clusters

?

Management clusters

?

?

Birds' response to management & habitat variables

Hypothesis at different scales:

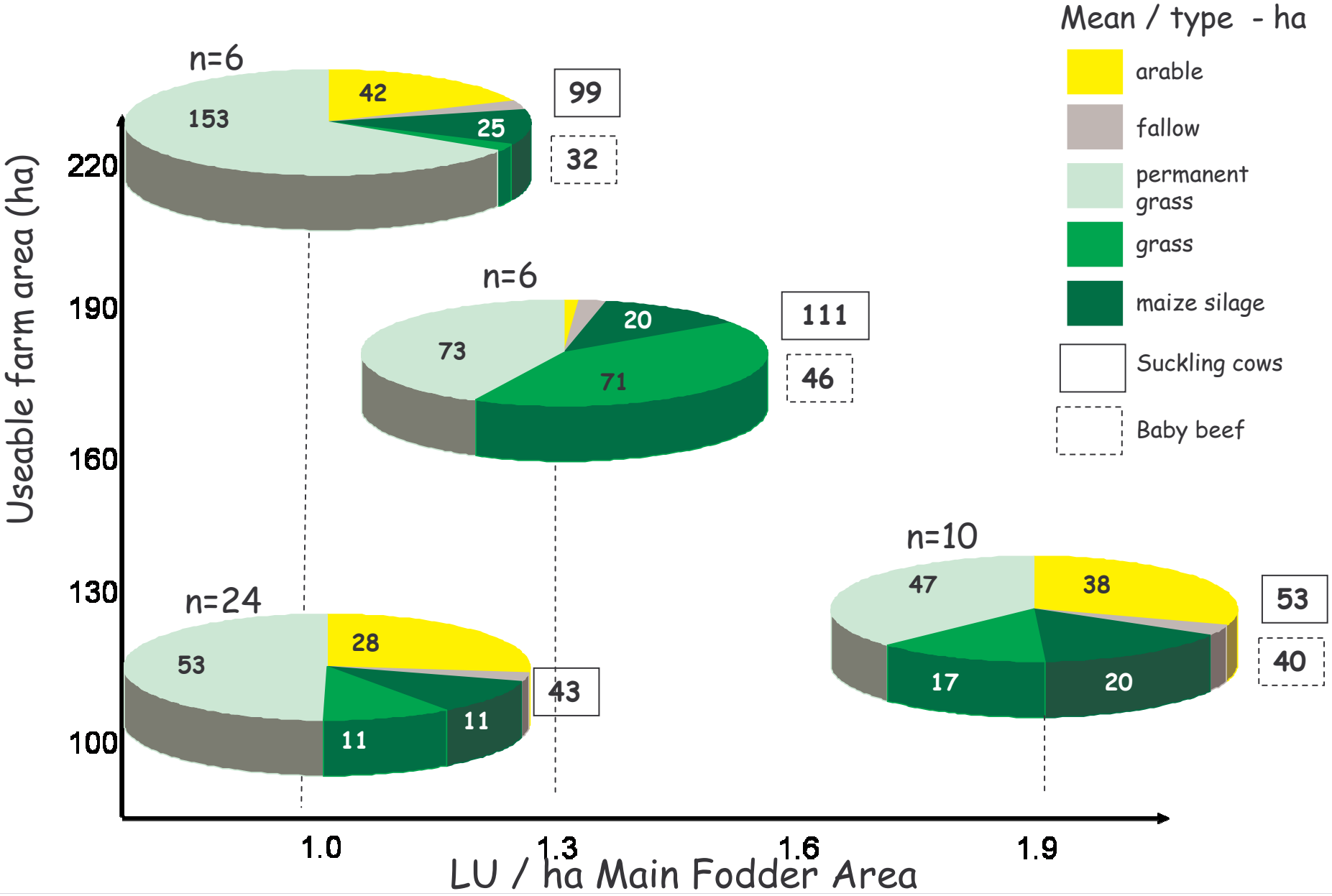
- Small farms have a less intensified main fodder area

- Management intensity related negatively to intensification of main fodder area

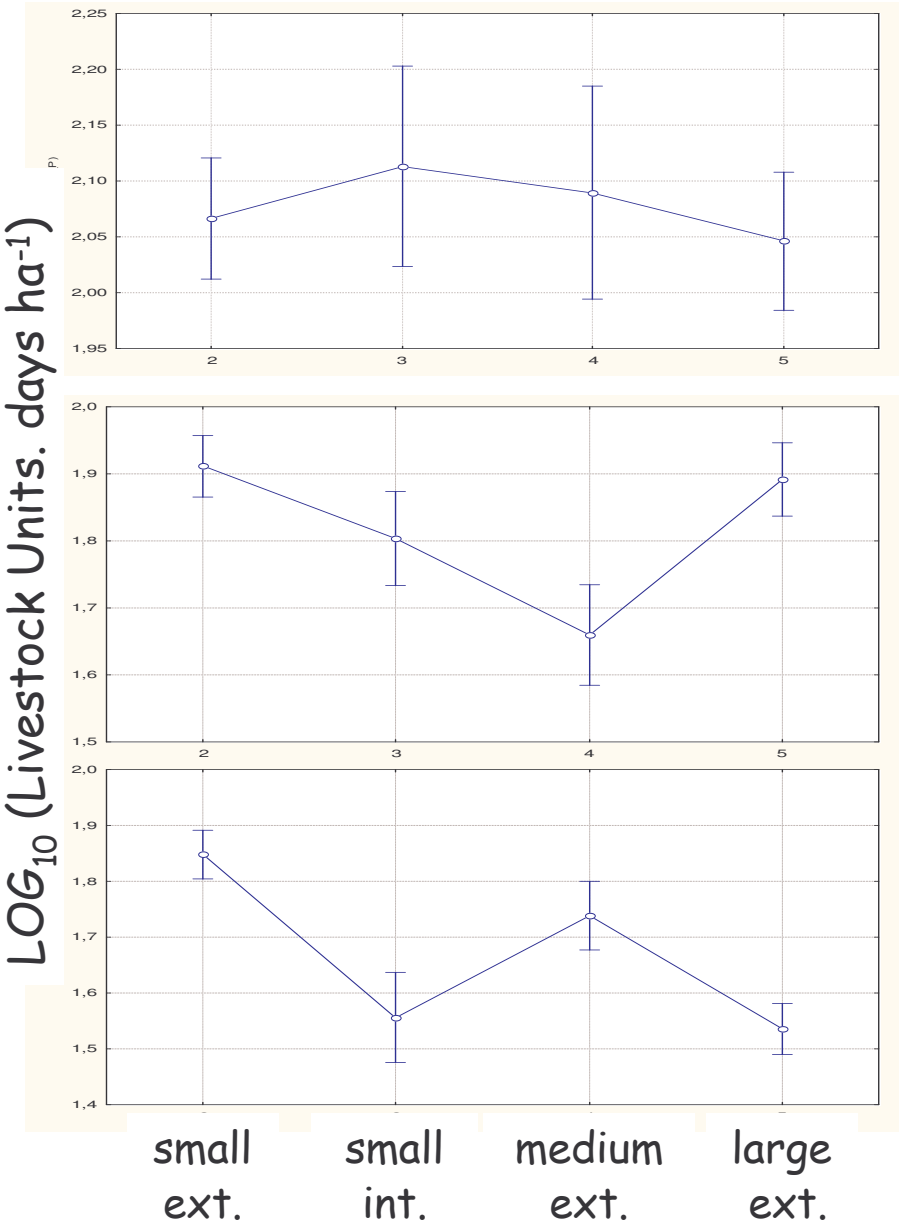
- Birds avoid the most intensified fields

Small farm more efficient for biodiversity conservation?

Farm size & intensity (n= 46, PCA & HC)



DOES grazing management differ among farm types?



No consistent pattern!

Spring
(F=0.56, p=0,64)

Summer
(F=12.04, p=0,0001)

Autumn
(F=35.81, p=0,0001)

Management: temporal sequence

Bird nesting periods

Stocking rate

spring | summer | autumn

early | mid | late

Grass growth

?

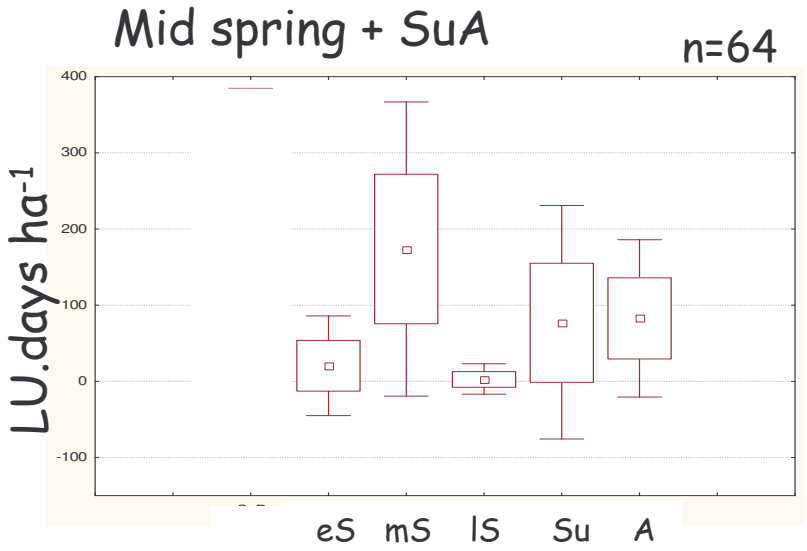
593 grasslands fields

N fertilisation
SR / period (6)
mowing

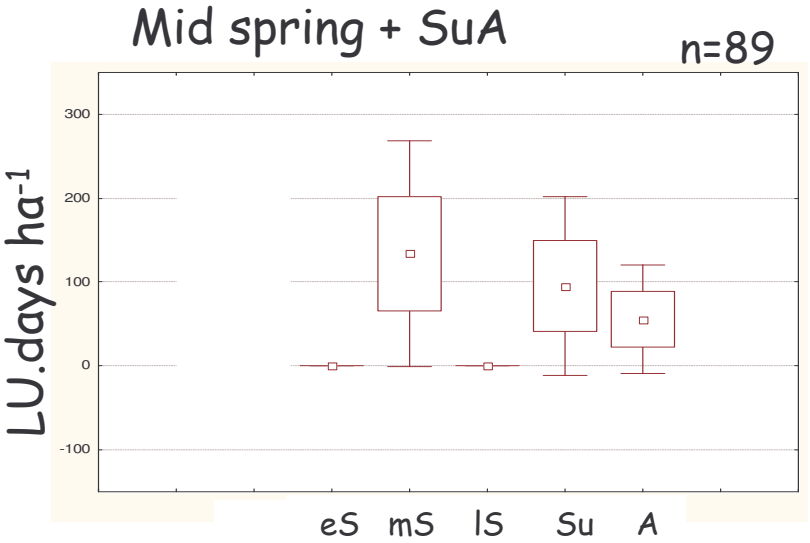
Clusters of management sequences built / PCA & HC

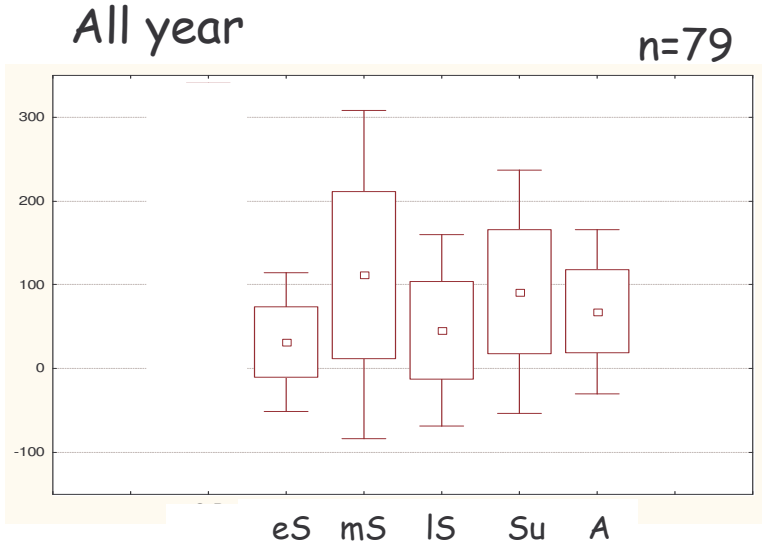
Management sequences clusters: grazing only
(n=232)

All fields with N fertilisation



Without N fertilisation

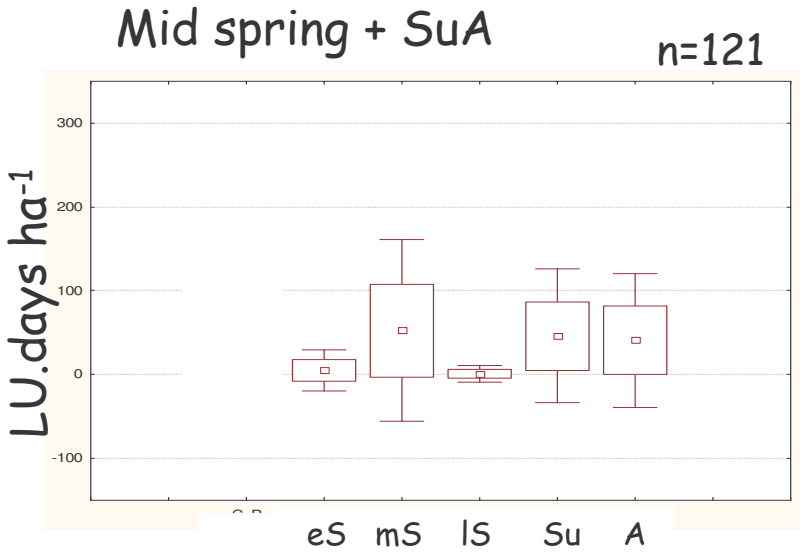


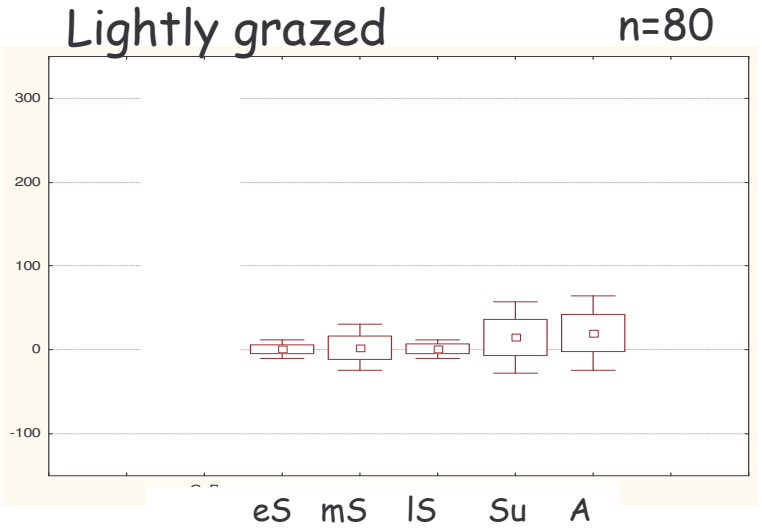


30% of fields with N fertilisation

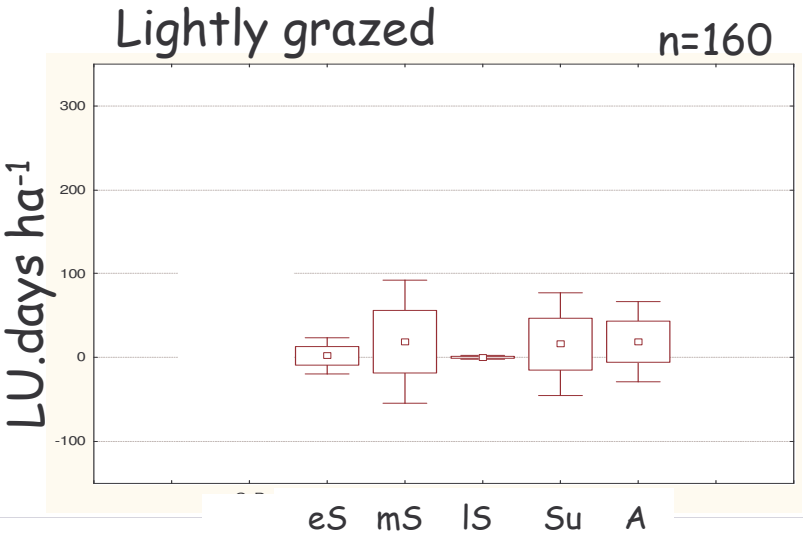
Management sequences clusters: mowing & grazing (n=361)

All fields with N fertilisation





Without N fertilisation



Management sequences implemented on 70% of permanent grassland area for the different farm types



Back to hypothesis:

- Large farms have a less intensified main fodder area but small farms do so !

- No relation between management intensity and LU/MFA
- But large farms are clearly the most extensive ones

- Sample ? Are "small" "small enough" ?

CONCLUSIONS

- Size matters: income, viability, flexibility, sensitivity to uncertainties

	Flexibility	Sensitivity
small	+	+++
large	+++	+

- Size also matters for biodiversity
- Limits may exist…

- Size also matters for other functions and conflicts may emerge ?

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