



Effects of sheep grazing on sandy soils and turf quality

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OVERGRAZING

Overgrazing is considered to be the major cause of soil degradation worldwide (Oldemann et al., 1991), accounting for 35.8% of all forms of degradation

Soil-plant system

- **Grazing animals cause a degradation process which brings a regression from high quality to low quality soil levels**

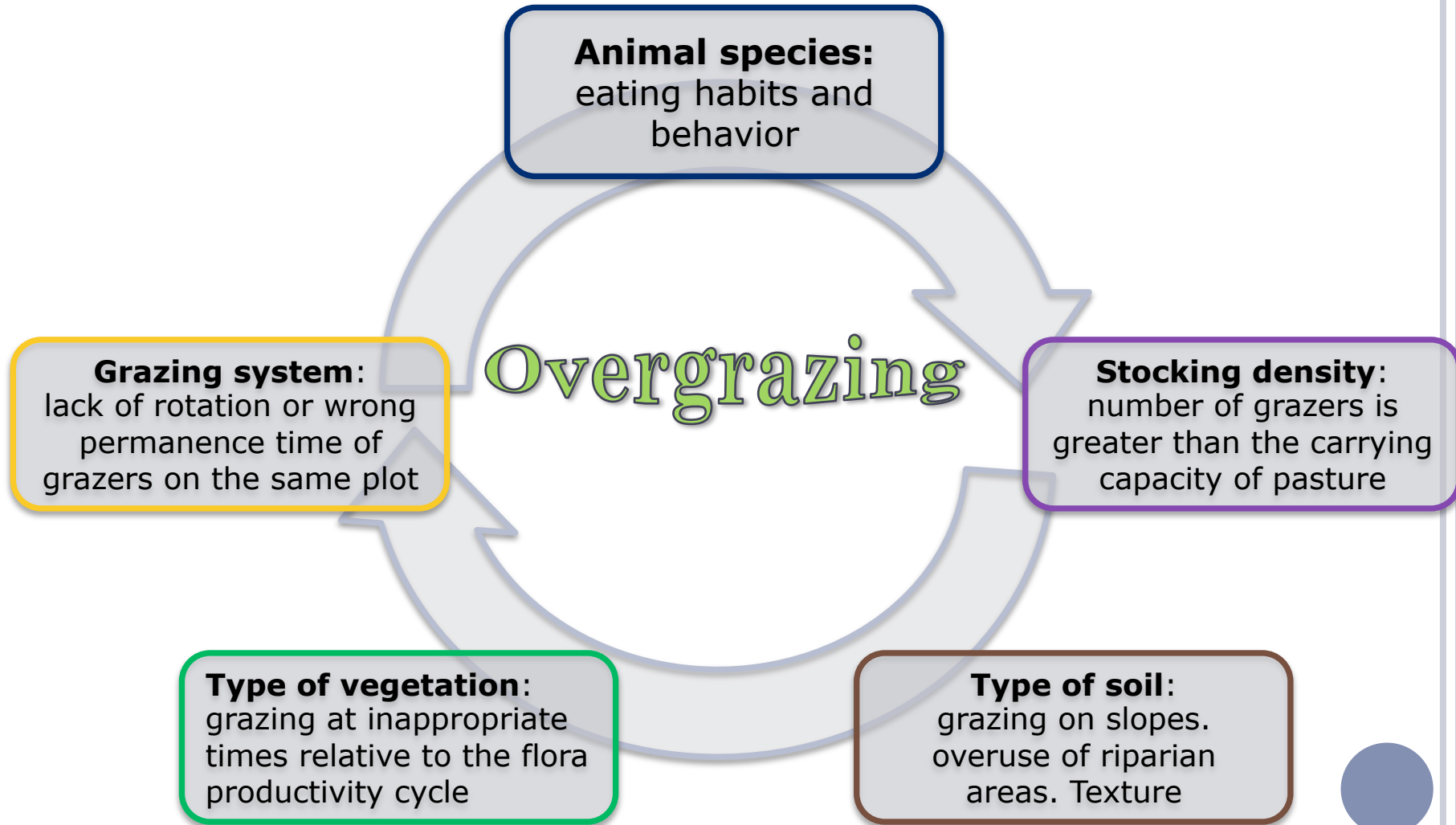
- **In the case of extreme deterioration it may cause the total loss of the soil's biological potential and its resilience**

- **Grazing animals have an effect on the botanical composition of pastures by trampling and selective grazing**

- **High grazing pressure decreases plant density**

ENVIRONMENTAL IMPACT

The environmental impact of overgrazing depends on an irrational choice of several factors:



CONSEQUENCES OF OVERGRAZING

The most important factors of the possible causes of this degradation process, are:

high animal pressure and time of permanence of animals



The animals have both a direct and indirect impact on the **health of the ecosystem**

direct

- **destruction of vegetation cover**
- **modification of phytocoenoses**
- **soil compaction**

indirect

- **selective pressure**
- **variation of soil quality**
- **soil erosion**
- **hydrogeological risk**



AIM



To evaluate damage from sheep overgrazing on **soils** and **pasture** quality at different intensities of grazing

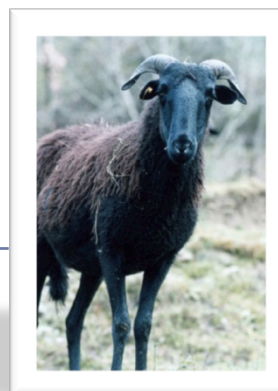


Experiments to recreate a situation of extreme zoogenic pressure due to overgrazing have been tried out by introducing high animal density to the pasture

- the plot chosen has never been used as pasture previously
- the plot chosen was on flat ground to avoid erosion

Site: S.Piero a Grado (Pisa)

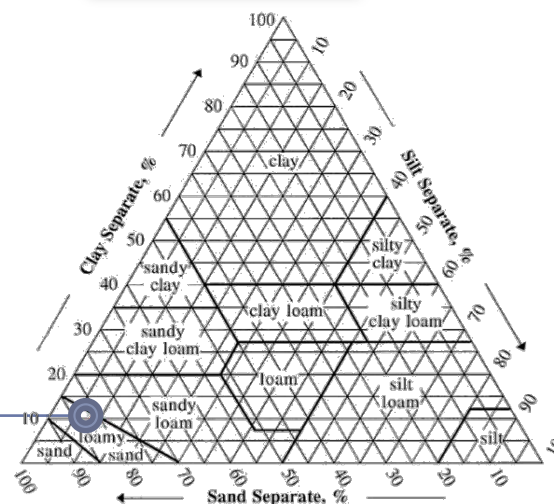
Animals: 15 Massese sheep



Stocking density: high (0.1 head/m²)

Plot: 150m²

Texture: sandy soil



TURF ASSESSMENT

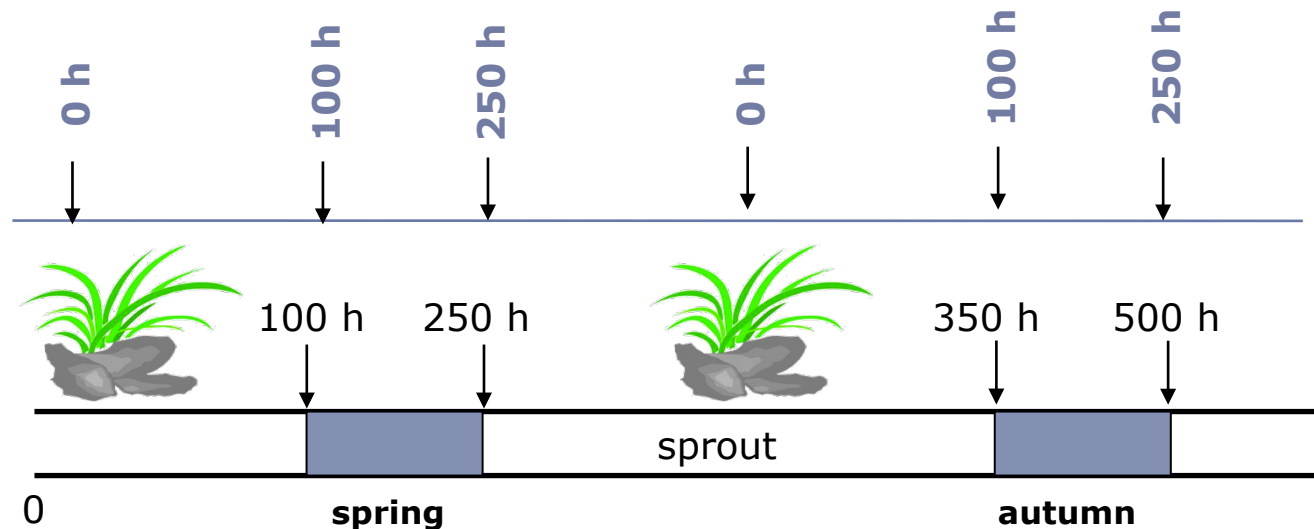
(D.A.G.A. Laboratory, Pisa University)

to evaluate the quality of the pasture

tests were carried out selecting 6 subplots of about 0.5 m²

→at the start of the trial and after 100 and 250 hours in spring

→at the autumnal sprout and after 350 and 500 hours in autumn



Botanical assessment → evaluation of major botanical families and pasture composition

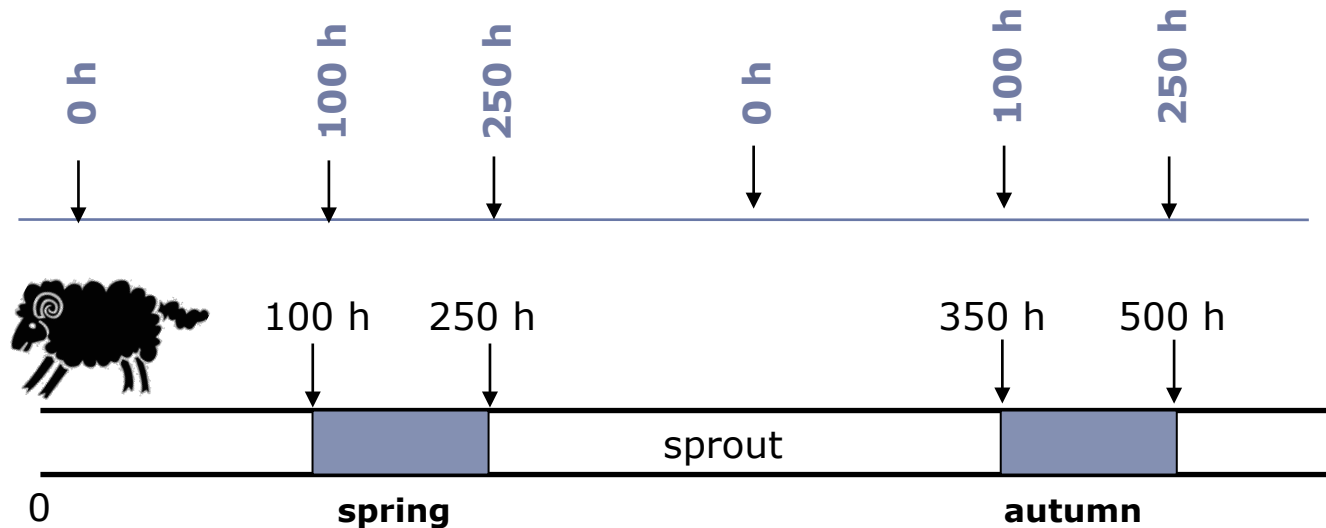
SOIL ANALYSIS

(ISE-CNR Laboratory, Pisa)

to assess the level of soil fertility

Soil samples were taken in triplicate

- before the introduction of animals (undisturbed)
- after 100 and 250 hours in spring
- after 350 and 500 hours in autumn

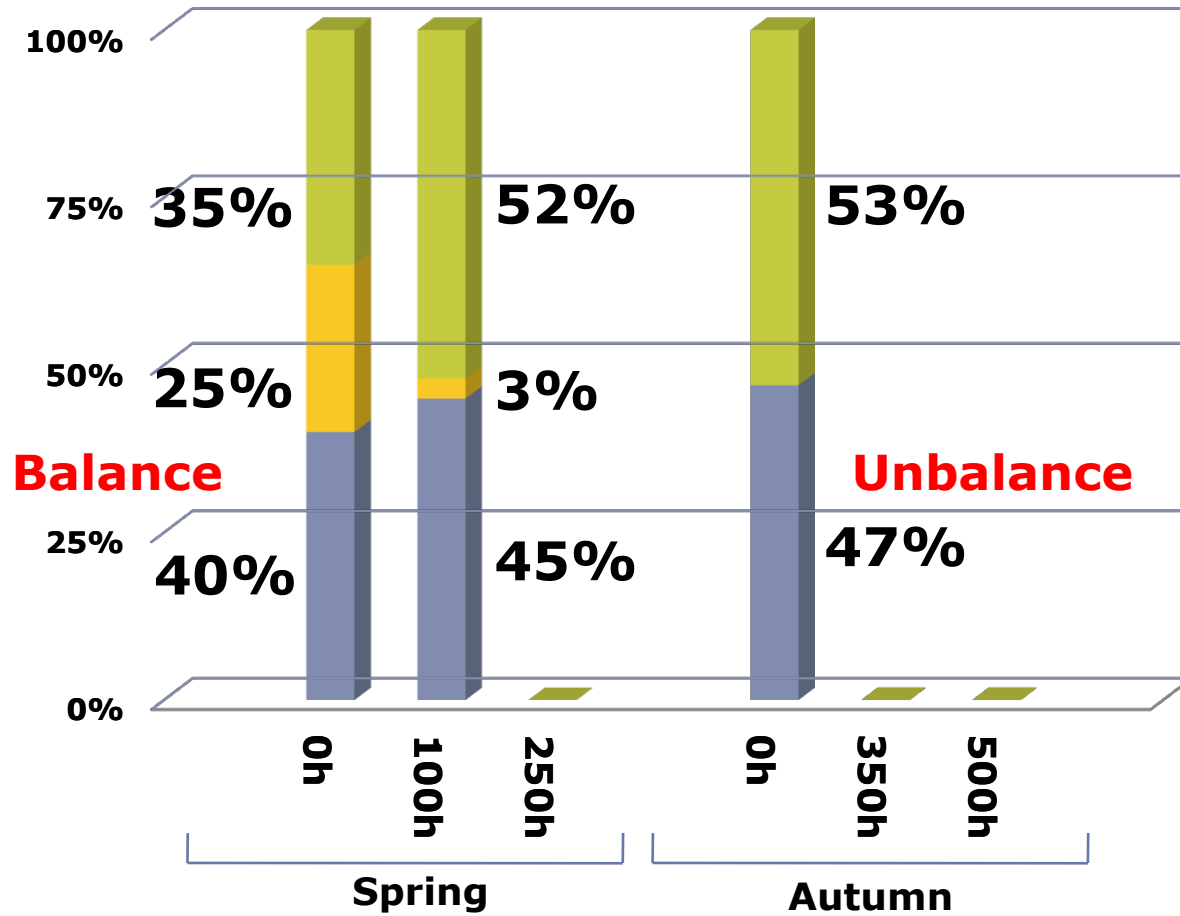


chemical analysis → total organic carbon, total nitrogen, water soluble carbon

biochemical analysis → β -glucosidase, dehydrogenase

physical analysis → total cracks, cracks $< 500 \mu\text{m}$, bulk density

Botanical evaluation



leguminosae
 graminaceae
 others species



RESULTS



EVOLUTION OF TURF DURING THE FIRST PHASE OF GRAZING (*Spring*)

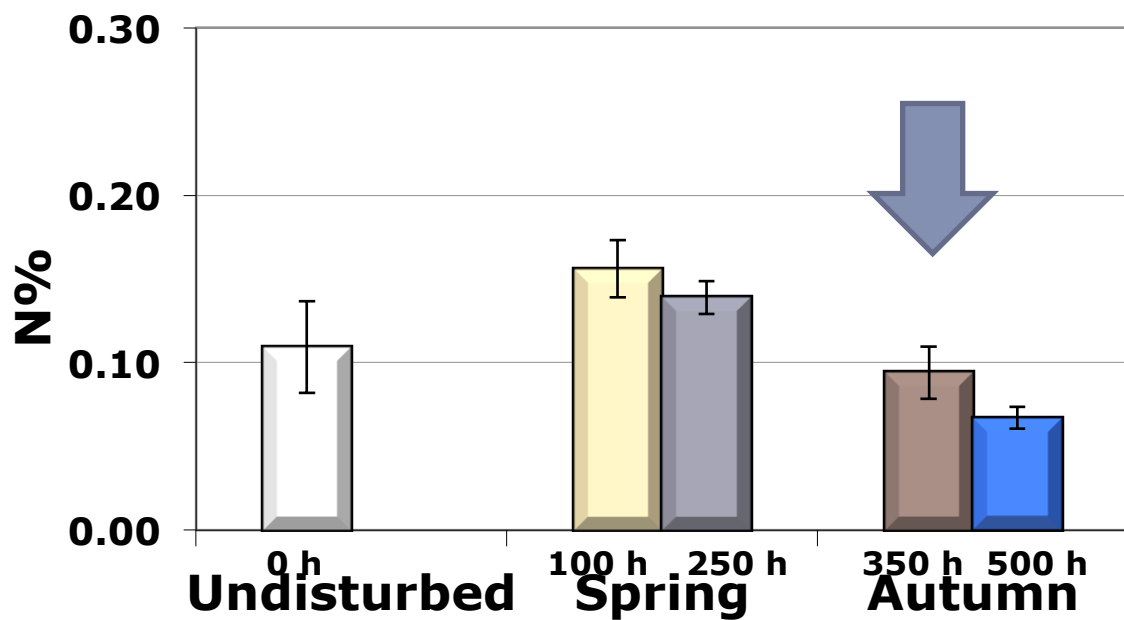
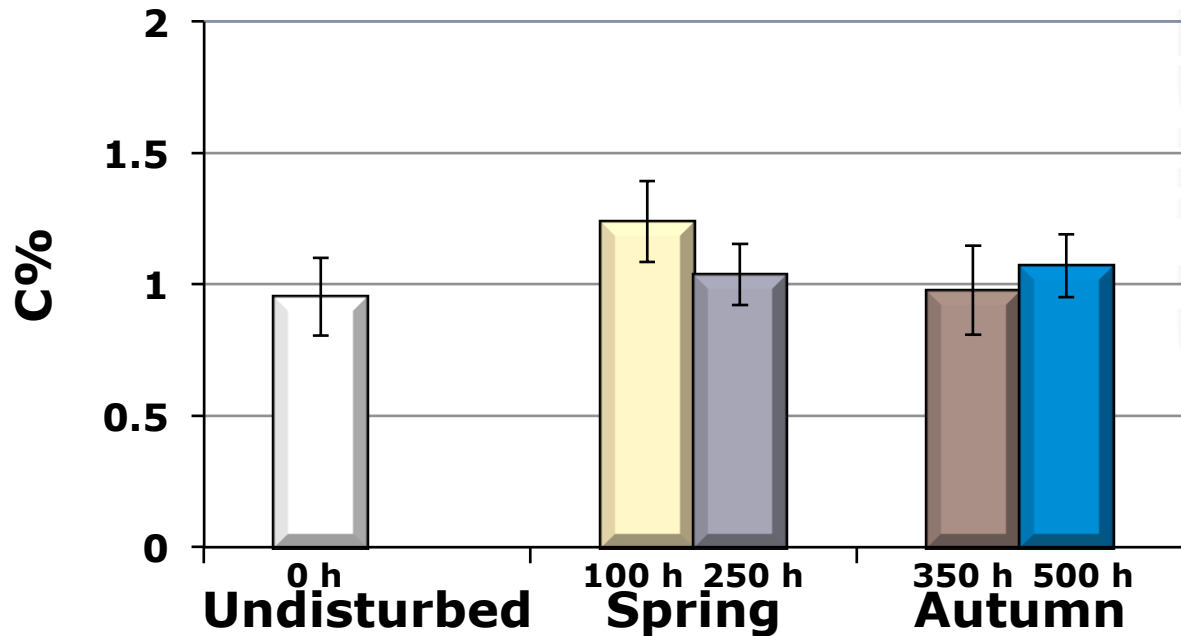


EVOLUTION OF TURF DURING THE SECOND PHASE OF GRAZING (*Autumn*)



Total Organic Carbon

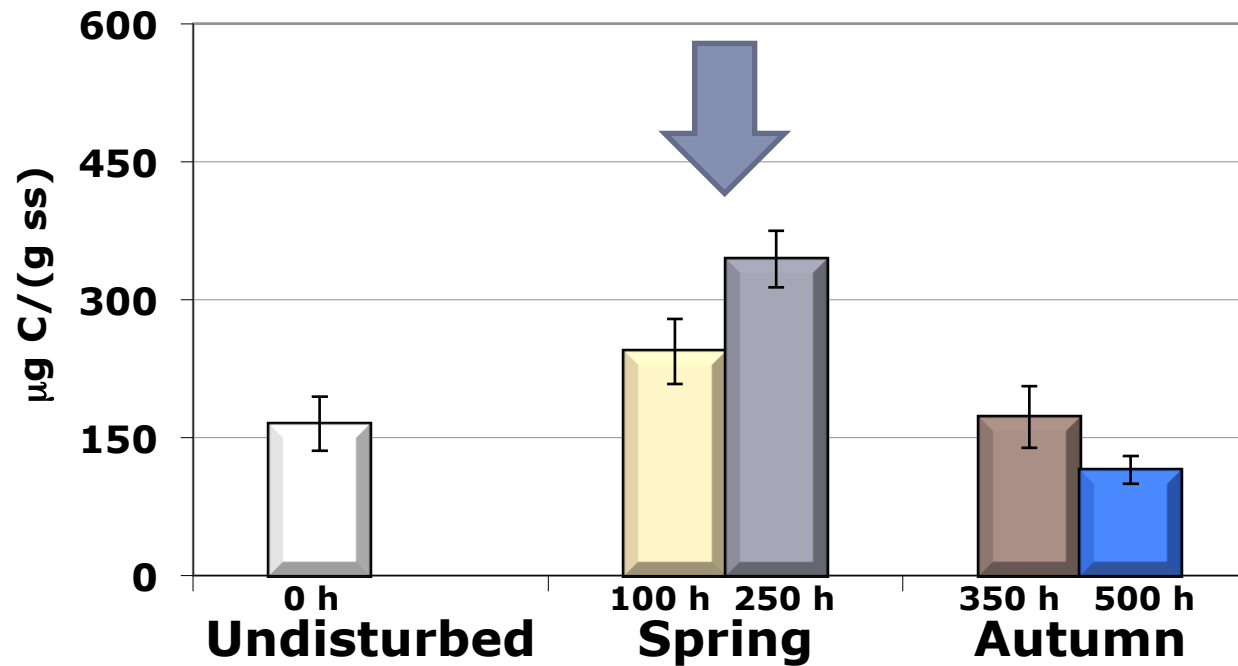
Total Organic Carbon and Total Nitrogen are good indicators of soil Organic Matter level



Total Nitrogen



Water Soluble Carbon

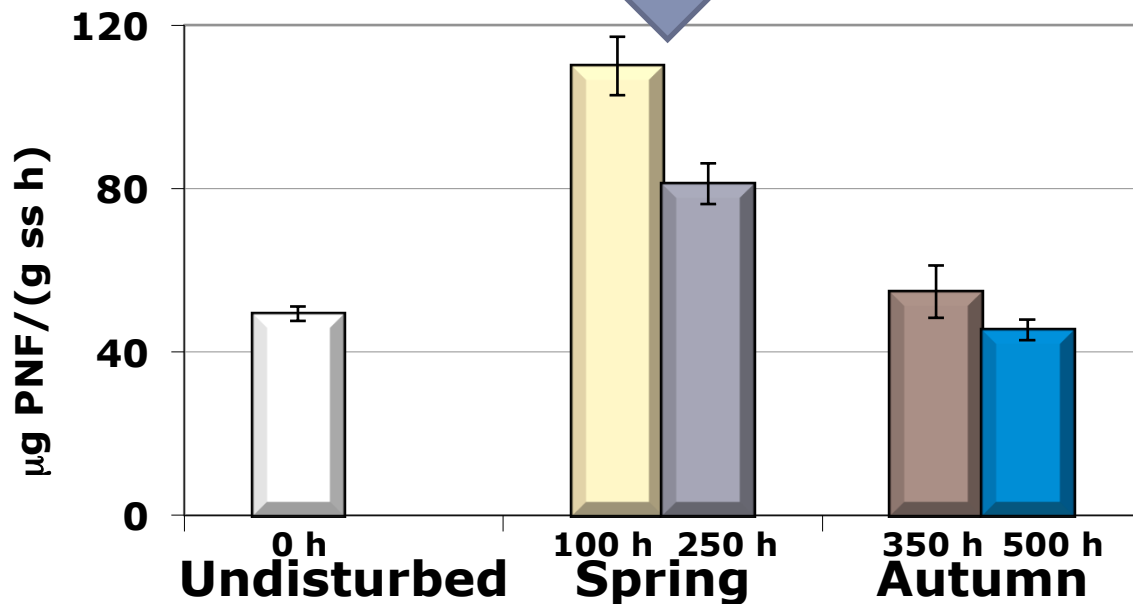
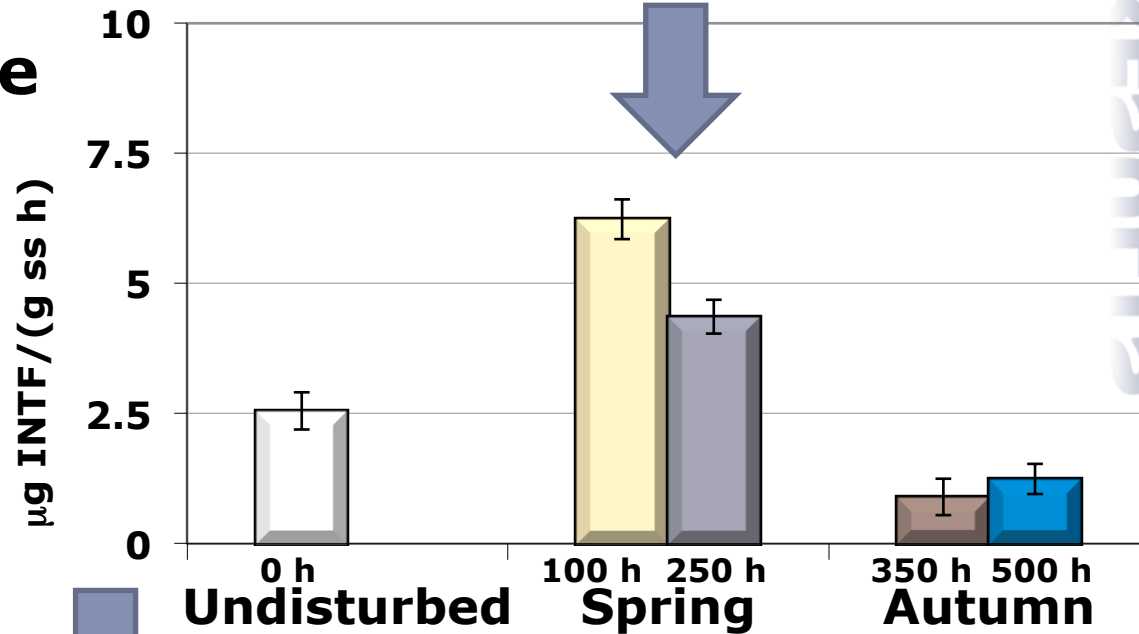


Water soluble carbon is the part that comes immediately available to the microorganisms in the food chain of the microenvironment



Dehydrogenase

Soil dehydrogenase activity is considered a good estimate of microbial oxidation activity of soil



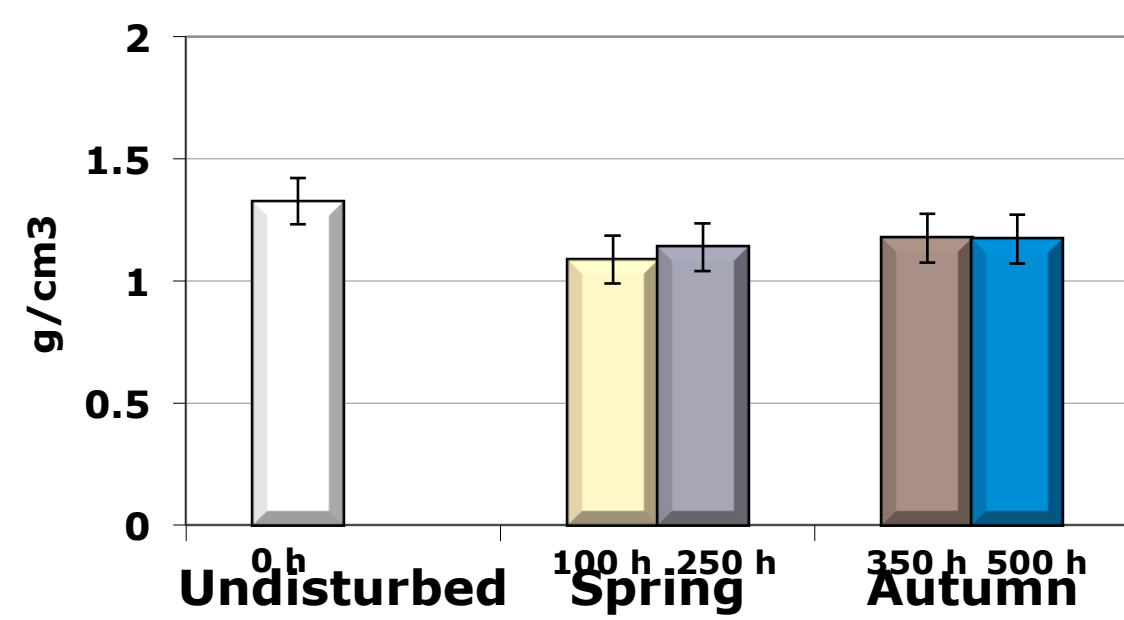
β - glucosidase

β -Glucosidase catalyzes the final limiting step of cellulose degradation.



Bulk density

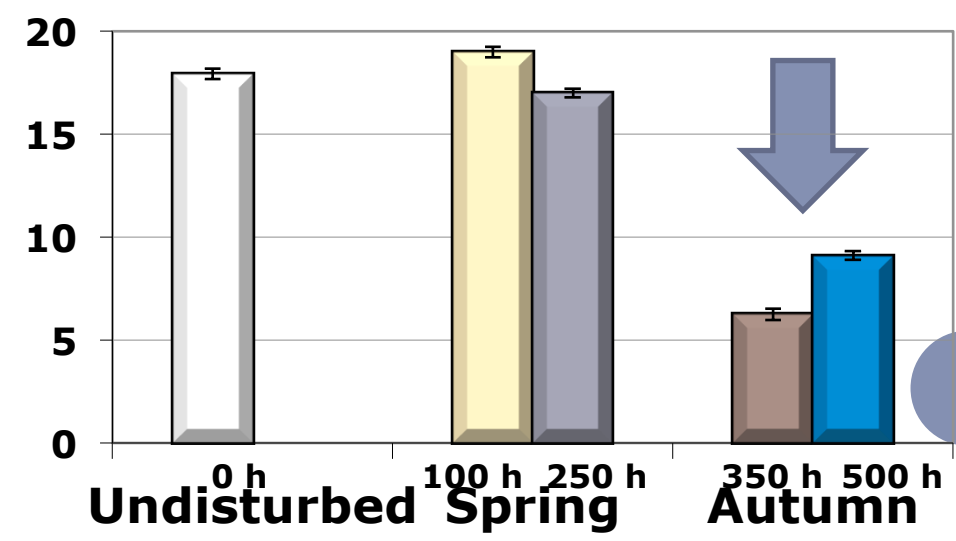
The Bulk density is used to estimate the physical fertility of the soil



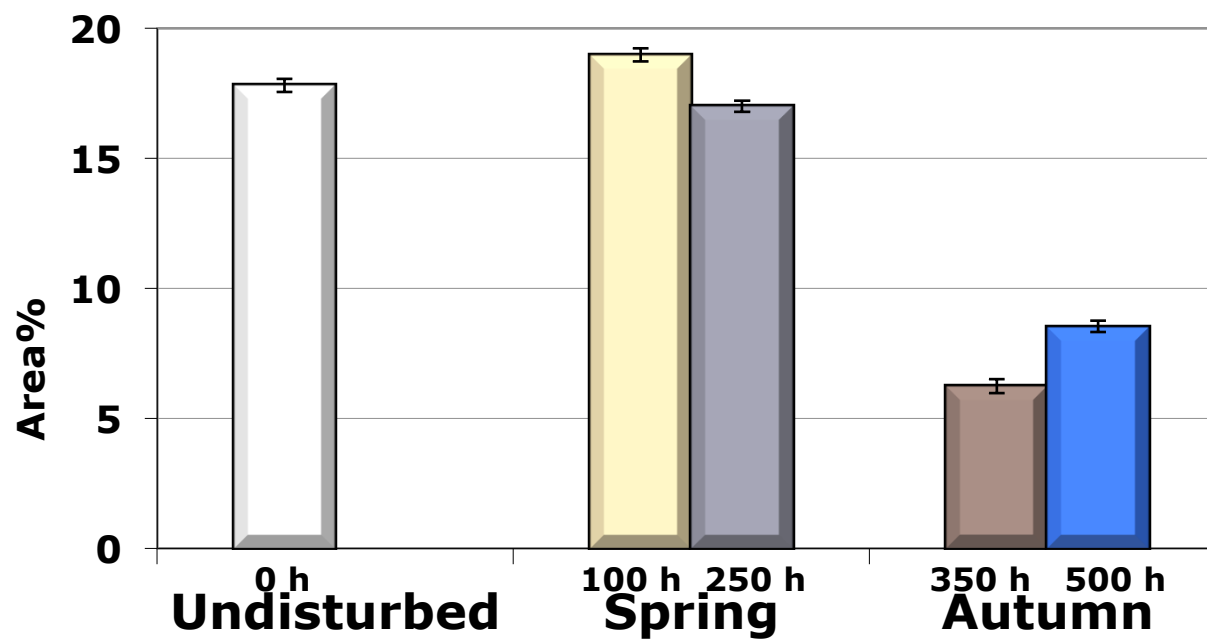
Total cracks

Total cracks is used to estimate soil structure.

The total shrinkage area is represented by a whole pool of cracks which range from 0 to 2000 μm diameter



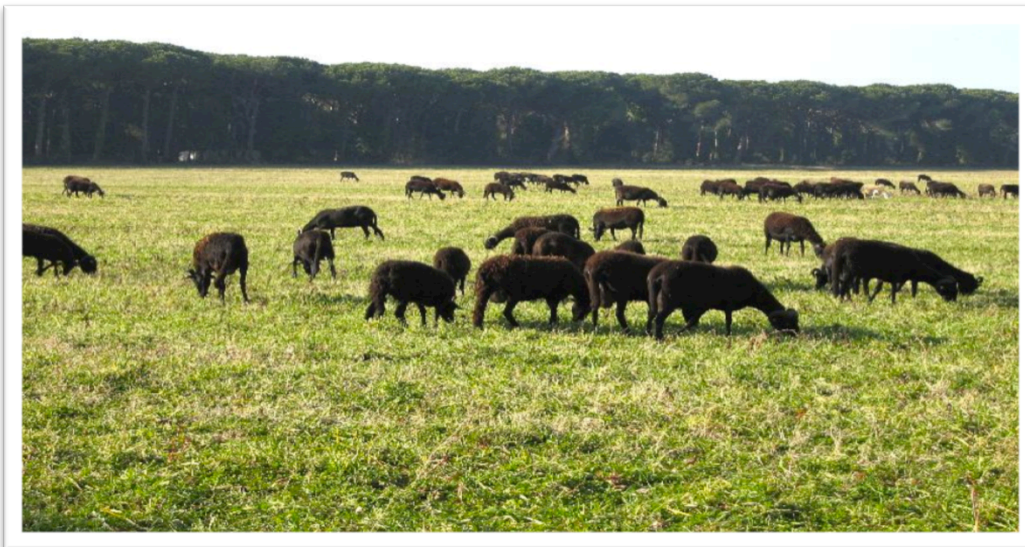
Cracks < 500 μm



Class corresponding to microporosity of soil, considered a reserve of water for plants and microorganisms



- ✓ The effect that grazing has on turf depends on the timing, frequency and intensity of grazing
- ✓ Overgrazing has not greatly affected soil *chemical parameters* (TOC,TN)
- ✓ Overgrazing adversely affects the *biochemical parameters* of soil



- ✓ Decrease in *Total cracks* and in *particular of cracks <500 μm* shows the deterioration of soil structure

The *soil biophysics* resulted the most affected property



Thanks for your attention