Grazing Management

Rangeland and Livestock Management 101

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Outline

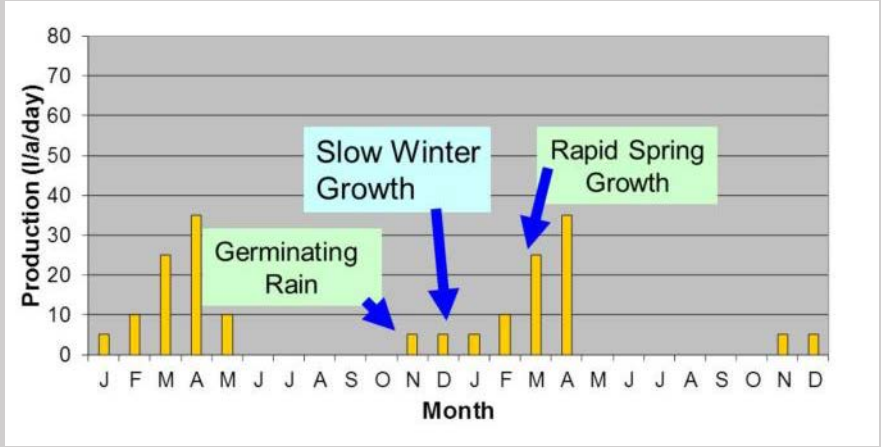
- Definition of terms
- Tools of grazing
- Plant defense against grazing
- Measurement of grazing impact/levels on rangeland
- Effect of grazing pressure on plants production/recovery

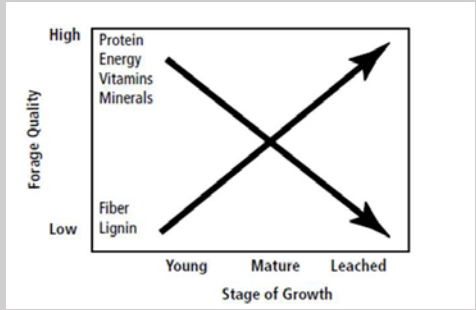
Grazing Management

- Control of the amount and timing of livestock grazing to achieve management goals
  - Livestock production
  - Multiple uses
  - Ecosystem services
  - Environmental sustainability
- A grazing management plan is part of ranch or allotment management plan

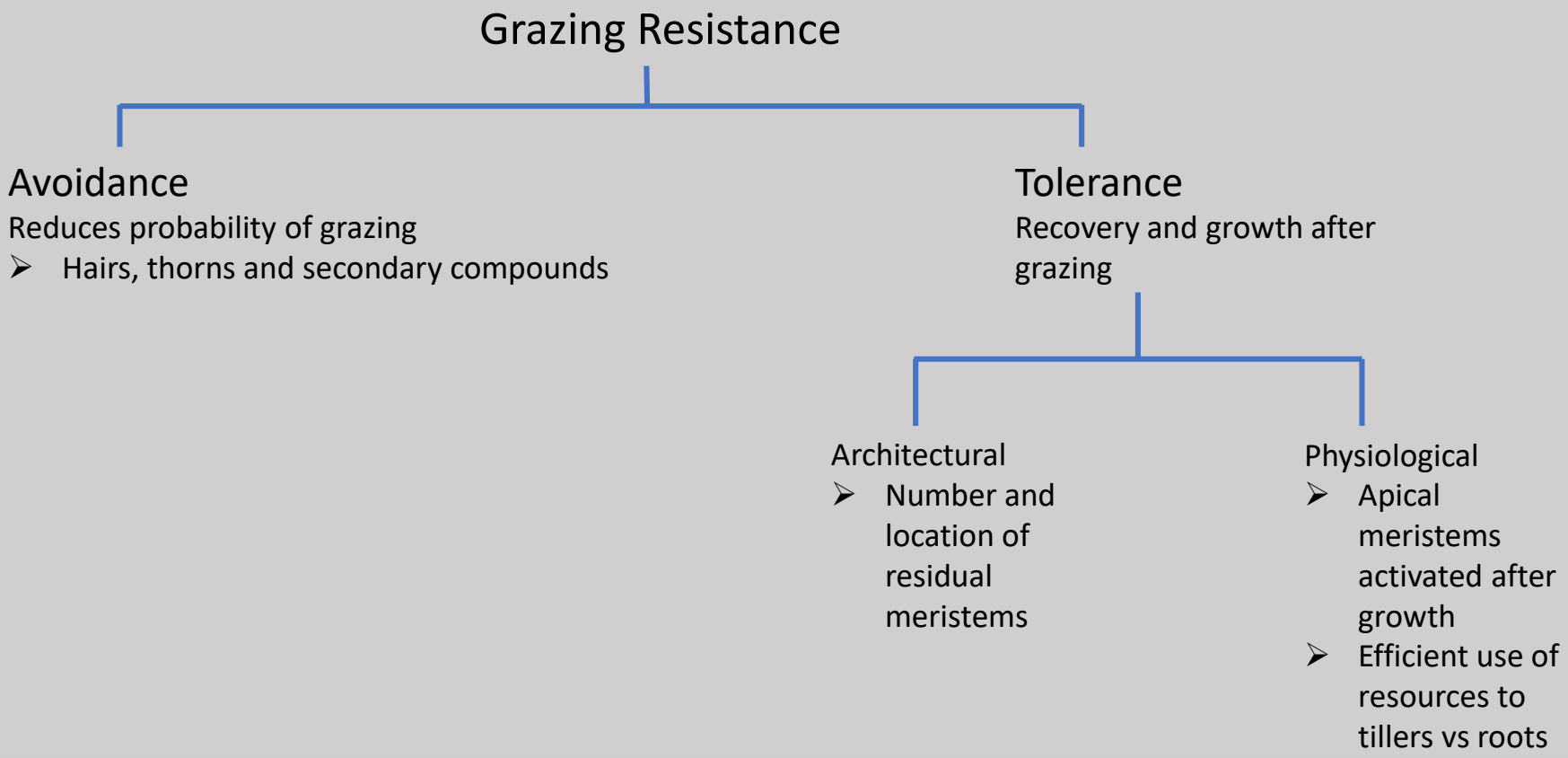
Tools for grazing

- Stocking rate
  - Grazing intensity
- Grazing frequency
  - length of grazing and rest period
- Kind of animal
  - Diet, poisonous plants, topography, water
- Season of grazing
  - plant growth, animal diet, multiple uses, nutritional value
- Animal distribution
  - Grazing efficiency, multiple uses





Grazing resistance



Animal unit (AU)

- 1000 lb animal or equivalent in terms of forage consumption
  - ~2% body weight (range 1-3%)

- 1 cow or cow and calf

Animal Unit Equivalent (AUE)

- 1 cow or cow and calf (1000lb) = 1 AU
- 6 sheep (150lb) = 1 AU
- 10 goats (100lb) = 1 AU

AU substitution rates

- Animal Unit equivalent is not the same as substitution rate

- E.g. 10 goats ≠ 1 cow based on forage intake
- Removing one cow will not provide enough forage for 10 goats
- May provide less or more forage depending on
  - Kind of plants
  - Season
  - Topography
  - Other factors

Animal Unit Month (AUM)

- Amount of forage 1 AU consumes in 1 month

- Example:
- 1 AU will eat 20lb of forage per day (2% body weight) → 600lb per month

- May eat more when forage is palatable, abundant, nutritious

- May eat less when forage is scarce, unpalatable or of low digestibility

Carrying Capacity (CC)

Number of animals a particular rangeland will support over a period of years while meeting ecological, animal and multiple use objectives

Factors affecting CC:

- Ecological conditions – vegetation type and condition, topography and climate
- Animal type and mix – diet requirements, grazing habits
- Infrastructure – fences, water points, supplements and animal distribution
- Management – knowledge, labor, commitment
- Multiple use, legal, or policy constraints

Stocking Rates (SR)

Number of animals (or AU) actually grazing on a given area of land for a specific period

Proper stocking rate:

- when stocking rate approximates the carrying capacity over a period of time
- Proper stocking vary over time

Stocking Rate units

Example

A 500 acre range stocked at 10 AU per year

AUM/acre = (10x12/500) → 0.24 AUM/acre

Acres/AUM – {500/(10x12)} → 4.17 acre/AUM

Stocking rate vs Carrying capacity

Stocking rate is a

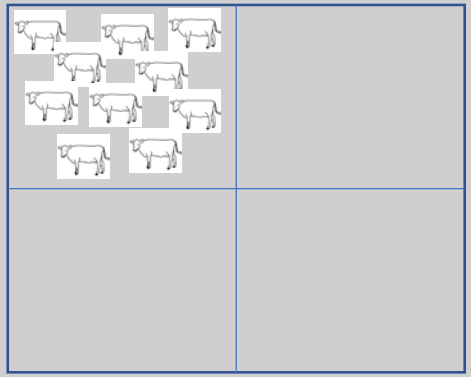
- management decision

Carrying capacity is about

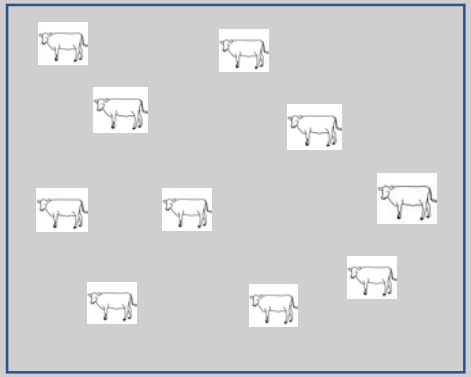
- ecosystem potential
- influenced by management goals
- management strategies

Stocking density

- The number of animal (AU) present per unit area of given pasture at a given time.
- Example: 1000 acre ranch with 100 AU



- Stocking rate: 1AU/100 acres
- Stocking density: 1AU/25 acres



Stocking rate: 1AU/100 acres

Stocking density: 1AU/100acres

Grazing pressure

- Amount of forage demand compared to forage availability (related to stocking density).
- Under high stocking density the amount of forage eaten compare to forage available is high.

- High grazing pressure can affect:
  - Diet selection
  - Forage quality
  - Total forage intake
  - Low regrowth rates
  - Low animal performance

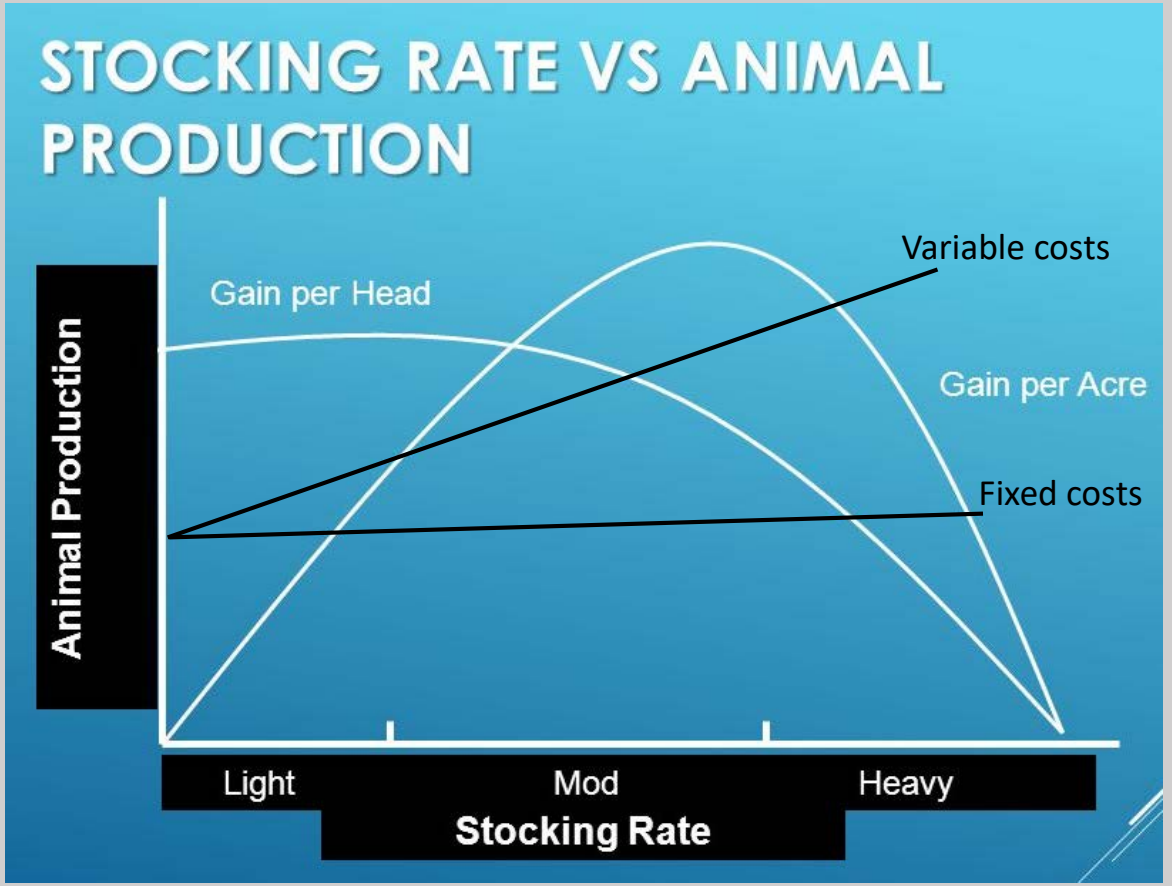
Stocking rate vs Animal production

Per head

- Stocking rate, animal production
  - ↑ Forage quality
  - ↓ Forage quantity

Per acre

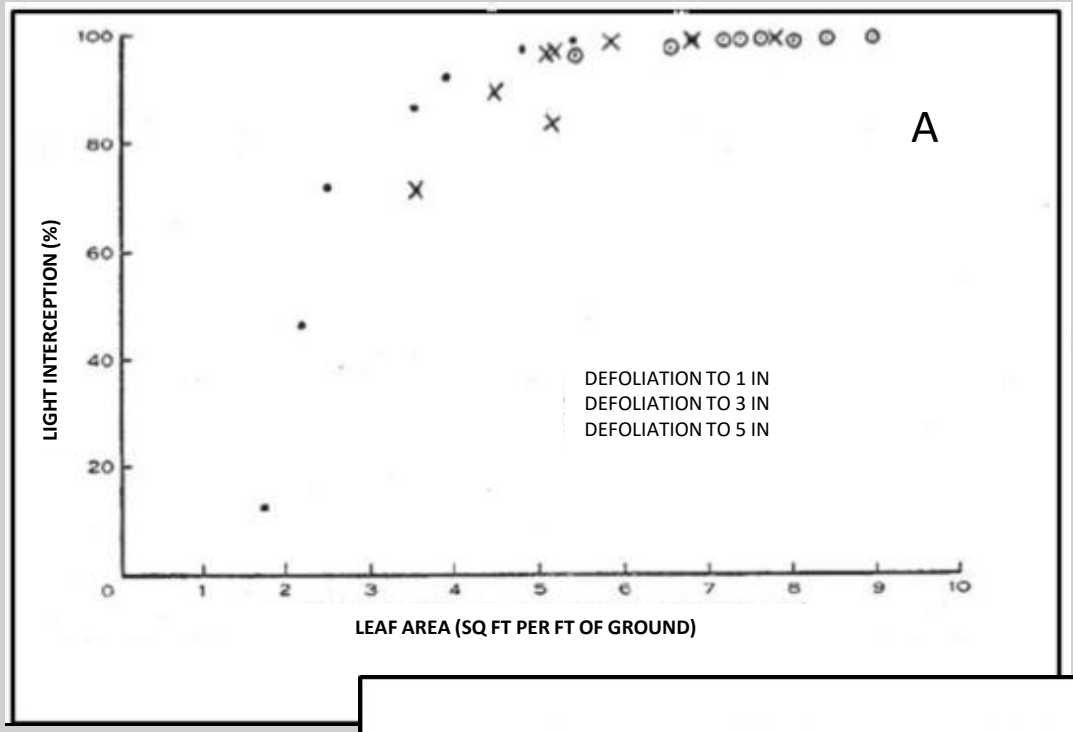
- As stocking rate increases total production
  - initially increases
  - then declines

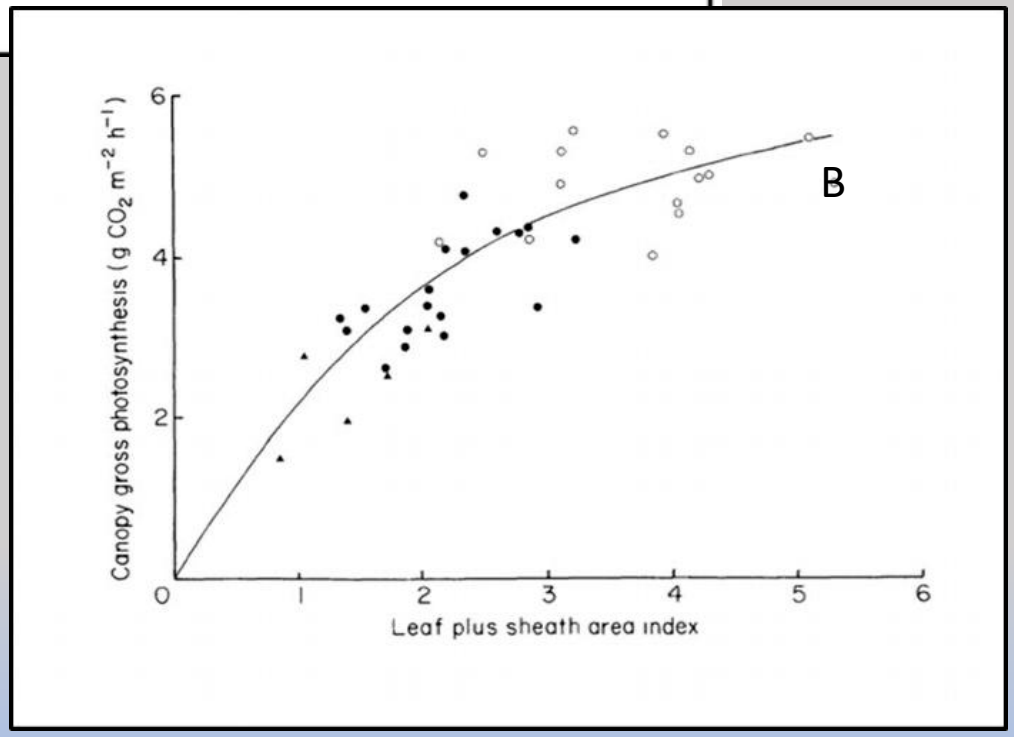


Grazing intensity and rate of photosynthesis

- Light interception increase as defoliation rate decrease
- But plateaus as height increase

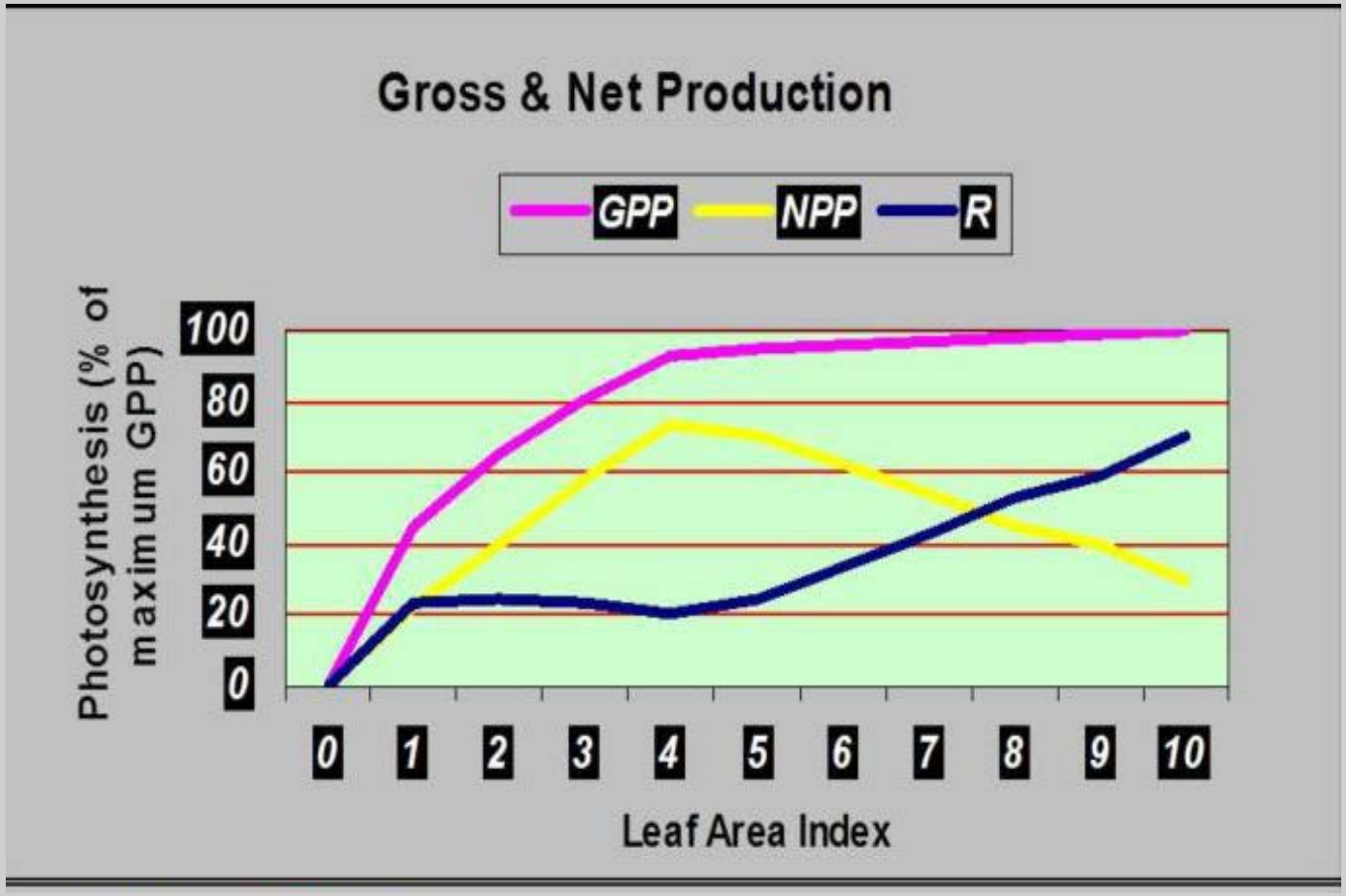
- Rate of photosynthesis follows similar trend





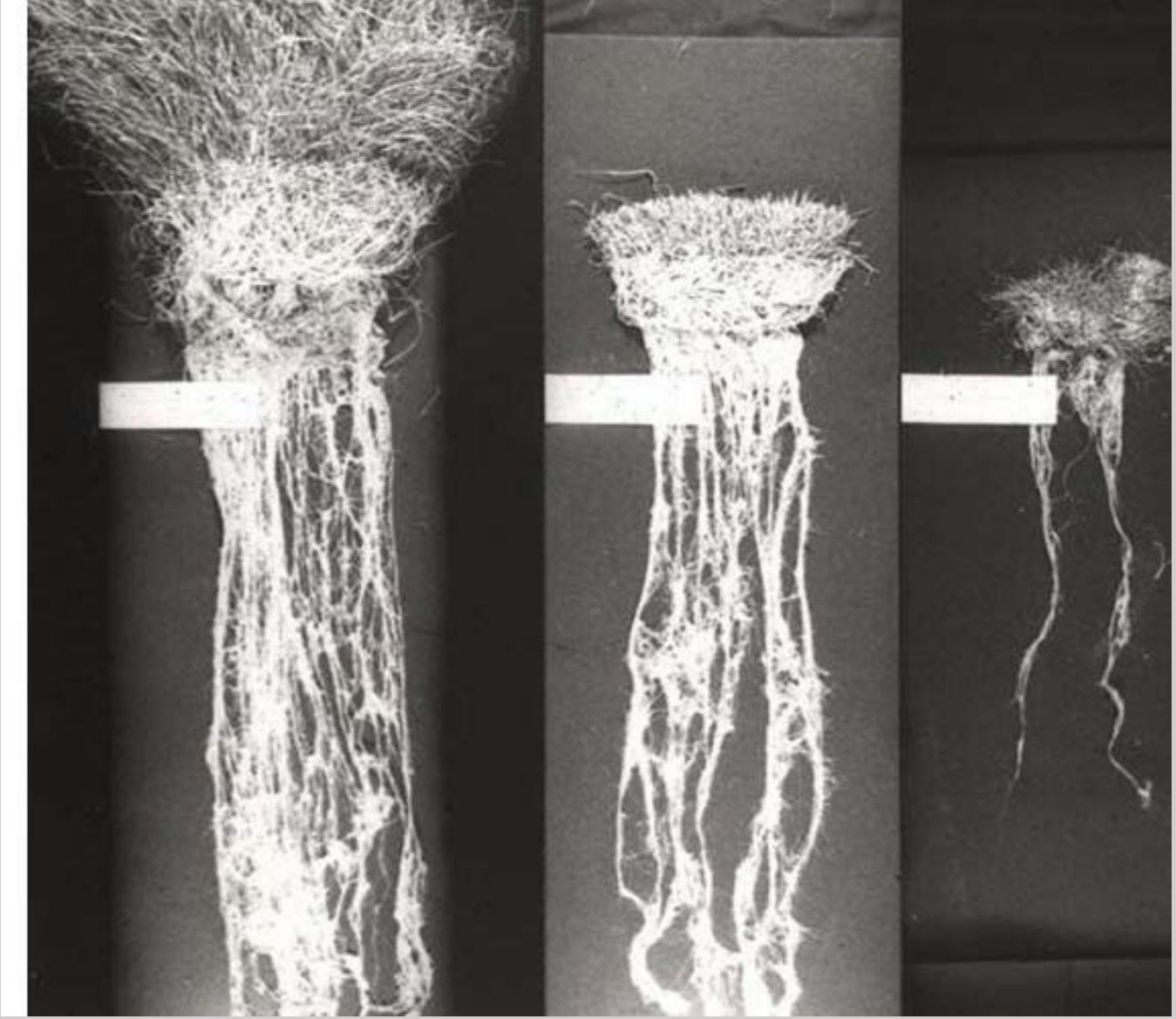
Grazing intensity and forage production

- Gross primary production (GPP)
  - Total carbohydrates produced during photosynthesis
- Respiration (R)
  - Energy burnt for plant survival
- Net primary production (NPP)
  - Available biomass
  - NPP = GPP – R
- GPP and NPP increase as LAI increase until upper leaves start to shade lower leaves → increased R
- Then NPP declines



Grazing intensity and root mass

- What happens below the surface matters too.



Low → Grazing intensity → High