

# Effects of stocking density and climatic conditions on forage and soil intake of crossbred beef heifers in a montane grazing system

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## Context

- Climate change**
  - Warming ⇒ heat stress on livestock
  - Intense rainfall events
- Grazing management in montane pasture**



## Full grazing experiment

- Where?** Swiss Jura, 1200 m a.s.l.
- Who?** Crossbred heifers
  - Brown Swiss ♀ x Angus ♂ (xAn)
  - x Limousin ♂ (xLi)
- How?** Crossover design
  - 2 consecutive periods of 10 days each: P1 and P2
  - 2 stocking densities: low SD- and high SD+
- What?** Individual intake, digestibility, forage selection



## Question

Can stocking density adaptation be a solution for grazing livestock to face this environmental challenge?



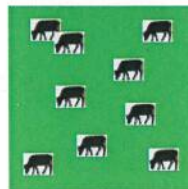
P1: 150mm rain in 8 of the 10 days

Period P1 - Wet



P2: 47mm rain in 3 of the 10 days

Period P2 - Dry



SD- 9.1 LU/ha



SD+ 14.8 LU/ha

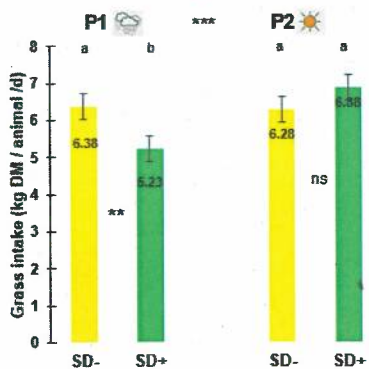
Stocking densities

n-alkane/Ytterbium double indicator technique + acid-insoluble ashes as internal marker for soil



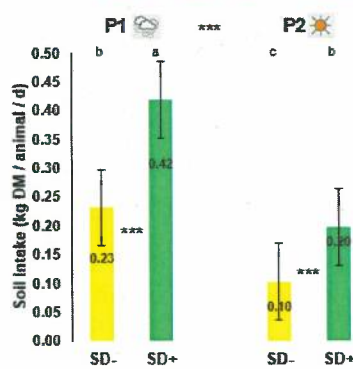
Estimation of individual grass- and soil-intake + digestibility

### Individual grass-intake



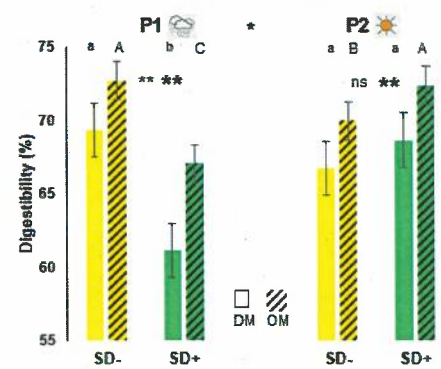
Cross-breed (CB) effect: xAn > xLi ( $P < 0.01$ )  
 Period (P); Stocking density (SD);  $P^*SD: P < 0.05$

### Individual soil-intake



CB: ns;  $P^*SD: P < 0.001$   
 ns: not significant;  $*P < 0.05$ ;  $**P < 0.01$ ;  $***P < 0.001$

### Digestibility

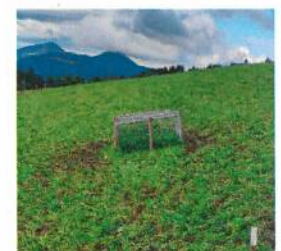


CB: ns;  $P^*SD: ns$

## Estimated forage consumption for each functional group

Consumed forage (% offered)	Grasses	Forbs	Legumes
Period-effect	✓ P1 > P2	✓ P1 > P2	‡ P1 > P2
Stocking density-effect	‡ SD+ > SD-	✓ SD+ > SD-	✗ SD+ vs. SD-

✓  $P < 0.05$  ‡  $0.05 > P < 0.10$  ✗ ns



Grazing exclusion cages were used to estimate forage selection

## Summary and Conclusions

By intense rainfall events and high stocking density: Forage intake and digestibility of DM and OM decreased and soil intake increased maybe due to higher trampling and soiling of the forage.

The percentage consumption of grasses and forbs increased.

In such situation, adapting stocking density may improve consumed forage quality and reduce soil intake

