

# Comparison of vegetation growth in a chicory based pasture and a multi-species based grassland



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Grassland from temperate areas have their growth lowered between 25°C and 35°C and **inhibited beyond 35°C** (Langworthy et al., 2015). The **summer climate condition contribute to the challenge of pasturing** on this season (Lemaire, 1987). To overcome this issue, resilient plants can be used to provide food when current meadow species growth is limited and/or inhibited. Chicory (*Cichorium intybus* L.) is one of them, it has a better access to water with its deep roots (Langworthy et al., 2015; Perera et al., 2019) and also, this plant has suitable nutritional values for animal feeding (Delagarde et al., 2014). Thus, aims of this study were **to evaluate the efficiency of chicory** to provide horses with enough food during summer, and also **chicory resistance to horse grazing**.

## Materials and methods

**Chamberet (France)**  
Duration : June 24th to October 08th in 2020

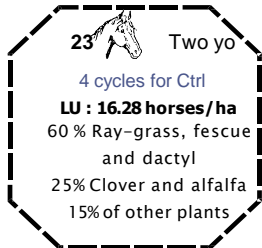
**Rotational grazing**



**Weekly (on 1 to 5 scale):** General attitude, hair state, body condition, swollen belly and faeces



Average time of grazing : 3 days (C and Ctl)  
Intercycle : 13 (C) and 23 days (Ctl)



### All pastures

Grass height : 30 to 45 points with plate meter (Jenquip©) before and after grazing

### Chicory pastures

100 points : type (plante, faeces, bare soil) and height recorded, before and after grazing

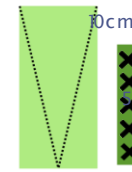
Measures allow to calculate density (D), height growth (HG) and biomass growth (BG) :

$$D = \frac{\text{weight of grass}}{\text{height of grass}}$$

$$BG = \frac{(\text{height before grazing}_n - \text{height after grazing}_{n-1}) \times D}{\text{nbr of days between grazings}}$$

$$HG = \frac{\text{height before grazing}_n - \text{height after grazing}_{n-1}}{\text{nbr of days between grazings}}$$

**Linear Mixed Model (LMM)** were applied to BG and HG with group (C or Ctl), grazing period (from 1 to 6 as continuous variable) and group:period interaction as fixed effects and grazing plot as random effect. **Wilcoxon test** was applied to compute paired period comparisons.



### Biomass sampling

Height before and after cutting with Herbostick. Grass samples were dried to estimate dry matter.

## Results and discussion

### Chicory soil coverage

Chicory (40–60%), grass (5–15%), legumes (up to 3%), other plants (23–30%), faeces (0–6%) and bare soil (9–23%).



**Few rainfall** between July 1st and August 12th => **15.6 mm**



**High temperature** : 20.67±3.43°C with a maximum of **37.40°C** => This period is considered as a **summer drought**.

### Biomass Growth

No significant differences were shown on BG between C and Ctl  
Overall evolution :

Highest early July with 33.70±13.86 kg of DM ha<sup>-1</sup> d<sup>-1</sup>

Decreased until early October with 3.22±1.64 kg of DM ha<sup>-1</sup> d<sup>-1</sup>



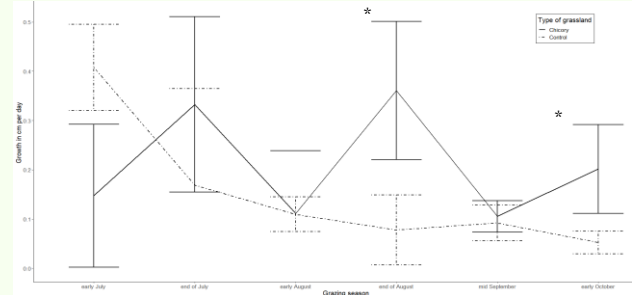
No adverse effects on yearlings health even though faeces were dung-like for chicory group

### Height Growth

Growth of grassland were the highest early July

Growth of C fluctuated more than Ctl

- LMM highlights interaction between type of forage and grazing period on HG (Fig1)
  - Higher growth than Ctl after summer drought period (C=0.36±0.14 cm.d<sup>-1</sup>; Ctl=0.08±0.07 cm.d<sup>-1</sup>)
  - Higher growth at the end of the grazing season (C=0.20±0.09 cm.d<sup>-1</sup>; Ctl=0.05±0.02 cm.d<sup>-1</sup>)
  - Trend toward higher HG for C early July (p=0.07 ; C=0.15±0.14 cm.d<sup>-1</sup>; Ctl=0.41±0.09 cm.d<sup>-1</sup>)



**Fig1: HG mean±SD per period depending on the type of grassland.** Significance (p<0.05) of the difference between C and Ctl pastures is indicated by \*.

## Conclusion



Differences between C and Ctl were observed only regarding height and not dry matter. High content of water of the chicory can explain this observation as this plant has less dry matter for the same amount of fresh matter than grasses or clovers. Result of this study showed the resistance of chicory facing drought and its capacity of growing despite an intensive equine grazing. Besides the confirmation that horses can be kept on chicory based pastures, this experiment indicates that this plant growth is higher than those of multi-species based grassland during after a period of drought.

## Bibliographie

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