Long Term Effects of Fall Dormancy & Grazing Frequency on Root Biomass of Lucerne Pastures

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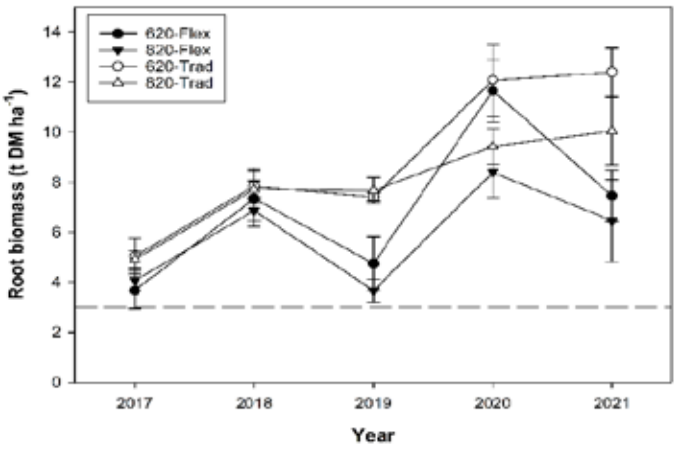
Introduction: Lucerne is the main grazed forage of Argentina. However, there is a large yield and consumption gap on most dairy and beef farms. There is potential to close such gap by increasing grazing frequency (Jáuregui *et al.,* 2022). However, the long-term effects of such management on lucerne persistence (i.e. root biomass) across different fall dormancy (FD) genotypes are unknown. The objective of this experiment was to test the long term effects of two grazing frequencies (500°Cd and 400°Cd growing degree days [GDD]) and two cultivars (L820 [Fall dormancy 8] and Nobel 620 [Fall dormancy 6]) on root biomass of lucerne pastures.

Method and Materials: A split plot rainfed experiment with 3 replicates was carried out at Gentos Research Station in Pergamino, Argentina. The experiment was sown on March 29th, 2016. Seeds were direct drilled with an experimental drill at a rate of ~10 kg of bare seed/ha. Main plots consisted of two cultivars (L820 [820] and Nobel 620 [620]) and subplots corresponded to two grazing treatments: a traditional [Trad] grazing management (year-round 500°Cd GDD grazing frequency), and a flexible grazing management [Flex] (400°Cd GDD grazing frequency during increasing photoperiods, and at least one rest [500°Cd] during declining photoperiods per year). Roots were sampled up to a depth of 30 cm. To do this, a trench was excavated from a 0.57 m^2 quadrat per plot once every autumn, starting from 2017 until 2021. ANOVAs were used to analyse differences in root biomass and Tukey tests for means separation ($\alpha = 0.05$).

Results: There was no interaction ($p>0.05$) between grazing frequency and cultivars for root biomass. Also, fall dormancy had no effect ($p>0.05$) on root biomass. In 2019 and 2021, root biomass was higher ($p<0.05$) in the Trad treatment. The largest difference was observed in 2019, when a drought limited the potential rest period for Flex treatments. The rest period requires lucerne pastures to be actively growing. Nonetheless, root biomass values for all treatments were consistently above the 3.5 t ha^{-1} threshold for persistence as reported by Moot et al. 2021 (Figure 1).

Figure 1. Root biomass (t ha^{-1}) measured during autumn. Vertical bars represent the SE of the mean. Asterisks indicate significant differences between grazing treatments.



Conclusions: Root biomass was higher ($p<0.05$) for Trad in 2019 and 2021. However, it was always above the minimum threshold required for stand persistence. Flex+820 was the most affected treatment. Higher FD lucerne cultivars could have partitioned biomass to aerial organs for a longer period than lower FDs. In these cases, it might be important to extend the duration of the resting period during declining photoperiod. This indicates that a more frequent grazing management that enhances animal production (Berone *et al.* 2020) can be implemented in lucerne pastures without compromising root biomass and therefore stand persistence.

References

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