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Seasonal influence on botanical composition of plantain, chicory, white-and red-clover based herbage mixes

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Introduction

Use of herb based sward mixes that are productive in different weather conditions could be an effective option to provide feed requirements for finishing lambs year round compared to ryegrass (*Lolium perenne* L.)/white clover (*Trifolium repens* L.) sward in New Zealand (Kemp *et al.*, 2010). Herbs such as plantain (*Plantago lanceolata* L.) and chicory (*Cichorium intybus* L.) and the legumes such as white clover and red clover (*Trifolium pratense* L.) as pure swards are known to improve lamb performance compared to ryegrass/white clover. Therefore, there is scope to have herb-clover mixes to enhance post-weaning lamb performance. However, one significant limitation in the use of these herbage is the seasonality of their production. A further issue could be their persistence and poor winter growth (Moloney and Milne, 1993). Botanical composition of a sward mix changes depending on the grazing management system. Herbs such as plantain and chicory are susceptible to winter grazing and treading damage affecting their proportion in a sward mix. A sward's botanical composition (legumes or grasses, leaf or stem materials, dead matter or weeds) and morphological composition (growth in different seasons), would likely affect the nutrient composition and lamb production (Lambert and Litherland, 2000). Therefore, it is essential to observe potential changes within and across seasons of the botanical composition in herb clover sward mixes.

Materials and Methods

A grazing experiment was undertaken for two consecutive years (2011/2012 and 2012/2013) in five different periods each year (winter, early spring, late spring, summer and autumn) with two herbage treatments. The herbage treatments were; i) Plantain mix (plantain cultivar Ceres Tonic, white clover cultivar Bounty and red clover cultivar Sensation) and ii) Chicory mix (plantain, chicory cultivar Puna II, white- and red-clover). The total grazing area per herbage treatment was 2.25 ha, with three replicates of 0.75 ha. Each replicate was further sub-divided to three 0.25 ha paddocks. Thus, each treatment consisted of nine paddocks. There were three mobs (groups) of weaned lambs per each treatment during each experimental period. Each mob of lambs was rotationally grazed within its three paddocks. During each period lambs were grazed for a maximum of two months. Lambs were then sold to a commercial abattoir and the paddocks were given a minimum two weeks rest period to re-grow. Before and after each experimental period (winter, early spring, late spring, summer and autumn), botanical composition was determined. Within each experimental period, twelve herbage samples were collected per paddock (replicate). These were pooled and composited and a 30 g sub sample was hand separated into individual sown (ryegrass, plantain, chicory, white clover, red clover) and non-sown (weeds and other grasses) species and dead matter in each treatment. After separation, each portion was dried in a draught oven for at least 24 hours at 70°C and the botanical composition of each treatment was presented on dry matter (DM) basis. Mean composition of the nine paddocks was used as the botanical composition of each treatment.

Results and Discussion

The proportion of plantain in the Plantain mix during late spring and summer in both years decreased but increased during winter, spring and autumn. This pattern suggests that plantain may prefer cooler temperatures and moist conditions in comparison to drier conditions. In contrast, red clover being summer active was higher in proportion during late spring to autumn but declined during winter and early spring. As in the Plantain mix, the plantain content in the Chicory mix declined in proportion during summer in both years. In contrast, chicory and red clover were dominant in the Chicory mix in late spring and summer. The white clover content was highest during late spring and autumn in the first year and greatly declined after late spring in the second year and remained low in both mixes. The main growth period of white clover is generally during spring and summer (Kemp *et al.*, 1999). The drought condition prevailed in the North Island,

New Zealand during 2012/2013 summer may have affected the persistence of white clover in the second year. The weed percentage in both herb-clover mixes decreased towards the end of the second year possibly due to the multi species mixes leaving less space for invasion of weeds. Dead matter percentage was highest in summer and autumn compared to winter and late spring in the two herbage treatments. This may be because of the selective grazing of green leaf material in the sward mixes leaving a greater portion of mature parts behind in the drier periods (Hodgson and Brookes, 1999). Plantain mix and Chicory mix paddocks were mowed in summer to remove tall weed species and unpalatable seed head stems during both years. This management practice may have also contributed to the increased dead matter percentage in summer in both mixes.

Conclusion

The proportion of plantain and/or chicory, white- and red-clover in the Plantain mix and Chicory mix differed across time enabling these herb-clover mixes to be productive during winter to autumn period across both years. Thus, this study provides evidence that herb-clover mixes can persist as multi species mix over a two year period at least. However, future studies might wish to follow these herb-clover mixes for a longer time to determine if they remain multi species.

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