Feeding value and potential antimethanogenic properties of novel pasture legume species

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Farming systems in southern Australia are continually adapting to changing economic, biological, and climatic pressures. An important element of pasture production in ley farming systems is the domestication of annual hardseeded pasture legumes (and their associated rhizobia), which fix nitrogen (N) and can self-regenerate from a seedbank after a series of crop rotations (Loi *et al*, 2012). Current, well established pasture species such as subterranean clover (*Trifolium subterraneum*) and medics (*Medicago* sp.) are becoming increasingly unreliable as part of the pasture production system due to; the lack of hard seed dormancy to protect against long crop phases and false breaks, increasing disease pressure and the low availability of commercial seed as a consequence of a diminishing specialised pasture seed industry (Howieson and Carr, 2000). This study aims to compare the uncommercialised species Scorpions Tail (*Scorpiurus* sp.), Trigonella (*Trigonella balansae*), Wooly Clover (*Trifolium tomentosum*) and current commercial pasture species including Biserrula (*Biserrula pelecinus)*, Serradella (*Ornithopus* sp.) and Helmet Clover (*Trifolium clypeatum*) with a focus on their nutritive value through the growing season and after senescence, along with potential antimethanogenic properties from pasture species as an additional benefit.

Analysis of each pasture species involved random grab sampling of plant stem, leaf, flower and seed from the Northam trial site (100 km east of Perth, 31390°S, 116410°E). Pasture samples were either oven dried for nutritive value testing or freeze dried for fermentation with rumen fluid. Nutritive value testing utilised near infrared spectroscopy (NIR) and wet chemistry analysis as per Norman *et al* (2010). Fermentation with rumen fluid was conducted *in vitro* utilising Ankom methane analysis technique with 123ml of rumen fluid and 1g of freeze-dried screened pasture sample, per incubation bottle, over a 48-hour period (Kinley *et al*, 2016). Assessment of feeding value through the decision support tool Grazfeed simulated two potential scenarios of grazing merino wethers or pregnant merino ewes to determine if novel pasture legume species will support livestock growth. Statistical analysis was performed through RStudio (Version 1.2.5001, RStudio, Inc., 2019) using a one-way T-test to compare mean, standard error and Tukey HSD test to determine significant differences within the data.

Initial results indicate dry matter digestibility for all species decreased over the four-month testing period, however Scorpions Tail showed a significant increase in digestibility during October when compared to other species. Crude protein (CP) values also decrease during the testing period, *Trigonella* produced the highest CP amount compared to other species tested. Gas production of all species remains to be analysed, however, it is predicted *Biserrula* is to reduce methane from previous results (Banik *et al*, 2019). Grazfeed feeding value predictions will conclude the nutrient value analysis with production values estimating future productivity of pastures utilised in the study.

The overall outcome of nutritive value testing from the pasture species will show potential productivity of new pasture species in a modelled environment through a single season period. It is envisaged that this will allow for better decision-making during pasture selection in different agroecological zones of southern Australia to increase productivity in livestock from a wider range of annual legume pasture species. The aims of this experiment were to evaluate the digestibility of novel legume species with biomass evaluation to understand future feeding values through decision support tools along with the assessment of antimethanogens within commercial and exotic pasture species in southern Australia.

References

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