# Nitrogen application and post-grazing residual height effect on degraded pasture nutrient yield

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Application of nitrogen (N) fertilizer is an established method to increase the dry matter (DM) yield of pasture (Eckard 1994). However, there have been inconsistent effects of N application on the nutritive value of pasture (Skerman and Riveros 1990; van Vuuren et al. 1991). Further, lower post-grazing residual height (4 cm) compared to higher post-grazing residual height (8 cm) increase pasture DM yield (Cranston et al. 2015). Many researchers have explored the effect of N application and post-grazing residual height on yield and nutritive value separately, but their combined effects require further evaluation. The purpose of this experiment was to investigate the effect of N input and post-grazing residual height combined effects on the nutrient yield of degraded sheep grazing pastures.

The effects of N rate and post-grazing residual height on the nutrient yield of degraded pastures (a mixture of annual ryegrass (*Lolium rigidum*), cape weed (*Arctotheca calendula*), barley grass (*Hordeum vulgare*), onion grass (*Romulea rosea*) and subterranean clover (*Trifolium subterraneum*)) were quantified for 73 days (Aug- Oct 2019) in northern Victoria, Australia. A 2×3 factorial design was used to test the effect of three rates of N application (30 (control), 60, and 90 kg N/ha) and two post-grazing residual heights (3 and 6 cm), with three replicates. Each replication was an area of 3 m2. Plots were mowed to mimic the grazing, and N was applied on the first day of the experiment. The pasture regrowth was harvested by mowing to designed post-grazing residual height on days 21, 42, and 73 of the experiment. Collected pasture samples were dried to quantified DM yield and analyzed for crude protein (CP) by Kjeldahl method (NFTA, 1993) and metabolizable energy (ME) (AFRC 1993) derived from digestibility of organic dry matter (DOMD) from pepsin-cellulase in vitro dry matter digestibility analysis. The CP and ME yields were calculated by multiplying CP and ME concentrations with the DM yield, respectively. The recorded data were analyzed using a two-way analysis of variance (ANOVA) by the statistical software Genstat 16. The least significant difference among treatments was calculated to distinguish among means at a 95% confidence level.

The pasture yields and CP yields increased when N application increased ($P<0.05$); (Table 1). However, ME yield did not change in the N application treatments (average 254 MJ/ha/day) due to lower ME content at the highest N rate. Low post-grazing residual height resulted in a higher DM yield ($P<0.05$) and CP yield ($P<0.05$) compared to high post-grazing residual height. However, there was no combined significant effect of N fertilizer rate, and post-grazing residual height were observed in this experiment on degraded pasture nutrient yield

| **Parameters** | **Fertilizer rate (FR) (kg N/ha)** | | | **Post-grazing residual height (RH) (cm)** | | **FR** | | **RH** | |
|---|---|---|---|---|---|---|---|---|---|
| | **30** | **60** | **90** | **Low (3)** | **High (6)** | **P value** | **LSD** | **P value** | **LSD** |
| Pasture yield (kg DM /ha/day | 24.7 | 31.1 | 37.9 | 35.6 | 26.9 | 0.005 | 7.05 | 0.006 | 5.75 |
| ME (MJ/kg DM) | 9.00 | 8.80 | 7.30 | 8.08 | 8.69 | <0.001 | 0.33 | <0.001 | 0.27 |
| CP (g/kg) | 180 | 195 | 205 | 192 | 195 | 0.074 | 0.32 | 0.678 | 0.26 |
| ME yield (MJ/ ha/day) | 211.9 | 273.8 | 275.0 | 279.6 | 227.5 | 0.138 | 58.5 | 0.094 | 47.7 |
| CP yield (kg/ ha/day) | 4.20 | 5.90 | 7.50 | 6.80 | 4.90 | <0.001 | 1.31 | 0.003 | 1.07 |

**Table 1: The effect of N fertilizer rate and post-grazing residual height on degraded pasture nutrient yield**

High N fertiliser and low post-grazing residual height had a positive effect on pasture DM and CP yield in this short-term experiment, but further analysis is required to determine if the production responses are economically attractive for farmers to adopt.

## Reference:

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