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Theme 5 | Grasslands and forages

Effect of grazing frequency on enteric methane emissions, output of milk constituents and milk yield

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Grazing management changes sward structure, affecting forage morphological characteristics and nutritive value, and ultimately animal performance and enteric methane (CH_4) emissions. The objective of this study was to evaluate enteric methane emissions and animal performance of lactating dairy cows grazing elephant grass (*Pennisetum purpureum* Schum. cv. Cameroon). Treatments corresponded to strategies of rotational grazing characterized by two pre-grazing targets; 95% and maximum canopy light interception ($LI_{95\%}$ and LI_{Max}, respectively). Post-grazing target corresponded to 50% of the pre-grazing targets. Twenty-two mid-lactation Holstein × Jersey cows (488 ± 60 kg) were stratified by body weight, days in milk (126 ± 90 days), lactation number (2.3 ± 1.2), and daily milk yield (20.3 ± 2.6 kg d^{-1}) in a completely randomized design (n = 11). The 2.5 ha experimental area was divided into two sets of 18 paddocks (700 m^2). Concentrate was offered twice daily before milking based on the average milk production of each group (1 kg of concentrate:3 kg of milk). Enteric CH_4 emissions were collected using the sulfur hexafluoride (SF_6) tracer gas method. Dry matter intake (DMI) was determined using titanium dioxide as a marker. Sampling occurred during the grazing season from December 2015 to April 2016. Results were analyzed using the PROC MIXED of SAS (α = 0.05). There were no treatment effects on DMI (18.4 kg d^{-1}, on average; $P = 0.090$) nor on daily CH_4 emissions (304.9 g d^{-1} on average; $P = 0.136$). Therefore, there were no treatment effects on enteric CH_4 emissions per unit of feed consumed (17.3 g CH_4 kg DMI^{-1}). However, cows grazing $LI_{95\%}$ swards had greater milk (17.5 vs 14.6 kg d^{-1}; $P = 0.043$), protein (0.55 vs 0.47 kg d^{-1}; $P = 0.029$), fat (0.66 vs 0.55 kg d^{-1}; $P = 0.027$), and milk solids yield (2.15 vs 1.79 kg d^{-1}; $P = 0.019$). Consequently, the $LI_{95\%}$ target resulted in lower enteric CH_4 emissions per unit of milk produced (16.7 vs 23.4 g CH_4 L^{-1}, $P = 0.002$), per unit of milk protein (528.1 vs 703.5 g CH_4 kg^{-1}; $P = 0.003$), per unit of milk fat (437.9 vs 606.5 g CH_4 kg^{-1}; $P = 0.001$), and per unit of milk solids yield (135.2 vs 186.1 g CH_4 kg^{-1}; $P = 0.001$). Grazing management based on the $LI_{95\%}$ pre-grazing target resulted in increased output of milk constituents and milk yield, whilst reducing CH_4 emissions per unit of final product. These results are likely associated with increased forage nutritive value in $LI_{95\%}$ swards, since no effects of pre-grazing targets were observed on DMI.

Keywords: light interception, *Pennisetum purpureum*, dairy cows

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