







Effect of manure quantity and quality on GHG fluxes from tropical pastures in Kenya

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Aims & scope

- livestock units.

Experiments on manure quantity and quality

a) 1.0 kg manure b) 0.5 kg manure





- Pulse of CH₄ emissions following dung application
- N₂O and CO₂ fluxes not significantly stimulated
- N₂O pulse emissions in response to heavy rainfalls

Period	Treatment	Net cumulat	EF			
		mg CH₄–C kg⁻¹ dry matter	g CO ₂ –C kg ⁻¹ dry matter	mg N ₂ O–N kg- 1 dry matter	CH ₄ EF (%)	N ₂ OEF (%)
2016.03.08 2016.04.05	control					
	0.5 kg manure	93.9 ± 34.1a	111 ± 121a	-1.64 ± 1.94a	0.02	-0.0101
	1.0 kg manure	84.0 ± 34.9a	32 ± 19a	0.03 ± 1.83a	0.02	0.0002
2016.06.24 2016.07.22	control					
	0.5 kg manure	126.0 ± 65.5a	11.1 ± 49.2a	$0.35\pm1.83a$	0.03	0.0021
	1.0 kg manure	154.1 ± 36.4a	22.5 ± 15.4a	$1.76 \pm 0.14a$	0.04	0.0109

		Net cumulative emissions			EF	
Period	Treatment	mg CH₄–C kg⁻	g CO ₂ –C kg ⁻¹	mg N ₂ O–N kg ⁻	CH_4EF	N ₂ OEF
		¹ dry matter	dry matter	¹ dry matter	(%)	(%)
2016.08.23 2016.09.16	control					
	60% maintenance	4.8 ± 8.3a	11.9 \pm 12.7a	1.34 ± 1.23a	0.001	0.0118
	100% maintenance	31.7 ± 6.8 b	$12.3\pm14.0a$	0.69 ± 0.55a	0.008	0.0051
2016.10.17 2016.11.10	control					
	40% maintenance	11.0 \pm 10.3a	$\textbf{4.3} \pm \textbf{6.4a}$	$-0.36 \pm 0.79a$	0.003	-0.0028
	Farm manure	107.7 \pm 39.5b	$7.6\pm23.7a$	1.55 ±2.91a	0.028	0.0090
2016.12.14 2017.01.07	control					
	60% maintenance	$5.9\pm2.4a$	$5.2\pm14.6a$	$0.37\pm0.85a$	0.001	0.0037
	100% maintenance	8.6 ± 8.5 a	15.5 \pm 11.0a	$0.79\pm0.52a$	0.002	0.0068
2017.01.10 2017.02.03	control					
	40% maintenance	$3.7\pm3.3a$	$\textbf{4.4} \pm \textbf{20.4a}$	$0.08\pm0.30a$	0.001	0.0007
	Farm manure	$120.2\pm21.3b$	15.2 ± 31.3a	$-0.06 \pm 0.54a$	0.034	-0.0003

- \bullet CH₄ emissions from farm manure dung patches were approx. one magnitude higher as from dung patches of cattle fed at 40% maintenance However, no significant manure quality effects were found on both net cumulative CO₂ and N_2O emissions across four observation periods \therefore N₂O emissions were highly variable with regard

- Total net GHGs cumulative emissions from 1.0 kg manure were twice as high as those from 0.5 kg manure dung in both experimental periods
- GHG emissions are scalable by weight •••

to total cumulative emissions over a four weeks period

Conclusion & Outlook

- > No manure quantity effect on GHG emissions
- \blacktriangleright Manure quality effect on CH₄ emissions can partly be attributed to the manure water content
- \geq N₂O emissions highly variable, N₂O EF of dung patches were in a range of -0.01% -- 0.01% significantly lower than currently suggested by International Panel on Climate Change (EF=2%)
- \triangleright Experiment will continue for other systems for developing robust emission factors for N₂O emissions

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