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Calculation of new enteric methane Emission Factors for small ruminants in Western Kenya highlights the heterogeneity of smallholder production systems

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Supplementary tables

Table S1: ***Seasonal mean live weight (kg) ±SEM for sheep males and females>1, young males and females 6mo-1yr and juveniles <6mo), Rainy season1 (RS)1, Dry season (DS1)1, Rainy season (RS2)2, dry season2 (DS2), disaggregated by Agro-Ecological Zones (AEZ) in Bomet county, Kenya***

BOMET/AEZ	RS1	DS1	RS2	DS2
Ewes (>1year)				
LH1	31.9±2.03	33.8±1.92	34.2±1.64	33.7±1.58
LH2	25.9±3.62	30.6±2.34	31.2±1.39	30.9±2.22
LH3	37.4±4.03	39.8±4.84	40.5±5.54	37.0±8.86
UM1-4	30.3±2.04	30.4±1.81	30.4±2.08	32.9±2.09
Mean	31.0±1.32	32.3±1.26	32.8±1.31	33.2±1.25
Rams (>1year)				
LH1	-	-	-	-
LH2	21.8±7.80	19.2±0.00	23.8±0.00	28.4±0.00
LH3	-	52.4±0.00	48.9±6.90	46.4±0.00

UM1-4	31.3±6.10	30.6±9.04	23.6±1.15	35.8±0.00
Mean	28.1±4.79	32.7±7.33	33.7±6.57	36.9±5.22
Young males&females (6mo-1yr)				
LH1	31.7±0.00	31.1±6.90	26.3±0.00	24.5±3.01
LH2	22.2±0.80	26.9±0.00	20.2±0.00	22.1±0.00
LH3	44.3±0.00	-	-	-
UM1-4	14.0±0.00	14.8±0.00	-	-
Mean	26.9±5.19	26.0±4.77	23.3±3.50	23.9±2.21
Juveniles (<6months)				
LH1	12.0±1.76	15.7±3.68	17.3±3.63	16.5±2.65
LH2	2.6±0.00	-	12.5±0.00	10.7±3.32
LH3	27.5±14.25	33.1±13.70	15.0±3.81	13.4±1.35
UM1-4	11.9±2.36	14.8±2.20	17.1±2.80	19.0±2.42
Mean	13.4±2.38	18.0±2.90	16.2±1.67	15.6±1.37

Table S2: ***Seasonal mean live weight (kg) ±SEM for goats' males and females>1, young males and females 6mo-1yr and juveniles <6mo), Rainy season1 (RS)1, Dry season (DS1)1, Rainy season (RS2)2, dry season2 (DS2), disaggregated by Agro-Ecological Zones (AEZ) in Bomet county, Kenya***

BOMET/AEZ	RS1	DS1	RS2	DS2
Does (>1year)				
LH1	34.1±0.00	33.5±0.00	34.1±0.00	35.9±0.00
LH2	27.7±3.20	27.4±2.91	27.9±2.76	26.5±2.63
LH3	26.2±1.79	25.6±1.72	25.6±1.62	29.3±1.86
UM1-4	29.1±1.22	30.5±1.42	29.0±1.10	29.6±0.94
Mean	28.1±0.95	28.6±1.04	27.9±0.87	29.2±0.80
Bucks (>1year)				
LH1	27.4±0.00	27.4±0.00	-	-
LH2	-	25.2±0.00	25.2±0.00	-
LH3	30.5±4.99	32.3±4.62	36.4±5.04	41.4±5.95
UM1-4	23.2±1.65	48.2±0.00	32.3±5.04	32.9±4.51
Mean	26.9±2.47	32.8±3.72	33.0±3.15	35.7±3.69
Young males&females (6mo-1yr)				
LH1	-		-	-
LH2	17.6±1.50	20.1±1.03	18.8±1.72	18.8±1.33
LH3	-	21.6±0.00	21.6±0.00	-
UM1-4	16.5±0.87	18.5±1.30	16.2±1.66	14.2±1.97
Mean	16.7±0.77	19.0±1.02	16.9±1.36	15.6±1.51
Juveniles (<6months)				
LH1	6.6±0.00	8.6±0.00	8.0±1.97	11.2±2.21
LH2	6.4±1.69	11.1±1.83	9.9±1.74	10.3±1.32
LH3	10.5±2.79	9.8±1.59	10.0±1.11	10.2±1.78
UM1-4	9.8±1.22	12.8±1.09	11.3±1.04	13.4±1.13
Mean	9.5±1.11	11.5±0.83	10.6±0.70	12.2±0.80

Table S3: ***Seasonal mean live weight (kg) ±SEM for sheep males and females>1, young males and females 6mo-1yr and juveniles <6mo), Rainy season1 (RS)1, Dry season (DS1)1, Rainy season (RS2)2, dry season2 (DS2), disaggregated by Agro-Ecological Zones (AEZ) in Nyando district, Kenya***

NYANDO/AEZ	RS1	DS1	RS2	DS2
Ewes (>1year)				
UM2	25.3±2.76	26.5±2.57	24.3±2.72	24.3±2.12
UM5	21.4±0.62	21.6±0.65	21.3±0.61	21.3±0.85
LM2	27.7±0.99	27.7±1.31	26.6±1.41	24.5±1.23
MEAN	23.3±0.60	23.4±0.65	22.5±0.61	22.1±0.71
Rams (>1year)				
UM2	23.0±0.00	23.0±0.00	17.5±2.10	17.5±2.10
UM5	24.7±4.84	26.0±5.14	29.3±9.42	32.4±12.89
LM2	34.6±4.95	-	32.1±5.49	32.1±5.49
MEAN	27.9±3.43	25.5±4.36	27.9±4.08	28.5±4.26
Young males&females (6mo-1yr)				
UM2	17.7±2.16	19.8±2.40	19.4±1.05	19.0±0.00
UM5	17.2±1.26	18.7±1.87	21.4±2.35	22.3±6.66
LM2	19.3±2.40	-	-	-
MEAN	17.9±1.02	18.9±1.49	20.8±1.68	21.2±3.99
Juveniles (<6months)				
UM2	8.9±5.53	8.4±0.00	9.5±1.96	9.5±1.96
UM5	7.6±0.87	8.7±0.79	10.9±0.91	11.4±1.13
LM2	12.0±1.20	9.7±2.27	11.2±2.12	14.8±3.78
MEAN	9.4±0.77	8.9±0.73	10.9±0.81	11.4±1.02

Table S4: ***Seasonal mean live weight (kg) ±SEM for goats' males and females>1, young males and females 6mo-1yr and juveniles <6mo), Rainy season1 (RS)1, Dry season (DS1)1, Rainy season (RS2)2, dry season2 (DS2), disaggregated by Agro-Ecological Zones (AEZ) in Nyando district, Kenya***

NYANDO/AEZ	RS1	DS1	RS2	DS2
Does (>1year)				
UM2	26.8±1.66	27.8±1.54	28.6±1.76	30.7±1.97
UM5	23.3±0.90	24.4±0.95	23.2±1.01	22.4±1.15
LM2	26.0±0.80	28.2±0.85	28.2±0.85	29.7±1.07
MEAN	25.3±0.58	27.0±0.61	26.9±0.66	27.4±0.84
Bucks (>1year)				
UM2	26.5±2.19	25.4±2.45	23.5±4.70	25.4±0.00
UM5	17.0±1.83	20.7±2.08	18.7±0.00	20.9±0.00
LM2	27.7±3.06	35.5±10.11	36.7±8.90	37.9±7.65
MEAN	24.5±1.68	26.0±2.48	27.8±4.90	30.5±5.37
Young males&females (6mo-1yr)				
UM2	13.8±1.50	16.7±1.44	16.6±1.06	16.6±1.06
UM5	13.7±0.75	16.8±1.50	18.2±1.62	17.1±1.03
LM2	13.5±1.72	15.9±1.20	17.9±0.91	19.8±1.27
MEAN	13.7±0.84	16.3±0.84	17.8±0.68	18.4±0.79
Juveniles (<6months)				

UM2	7.5±0.75	9.1±9.11	10.4±1.12	11.4±1.45
UM5	10.4±0.87	8.8±0.77	10.3±0.76	11.0±0.95
LM2	10.6±0.60	12.6±0.74	11.8±0.84	12.6±1.10
MEAN	10.0±0.44	10.5±0.48	11.1±0.53	11.8±0.68

Table S5*: Seasonal mean weight changes (g/d) for goats' males and females (>1 year), young males and females (6-12 months) and juveniles (<6 months) sheep across the three agro-ecological zones in Bomet County*

BOMET/AEZ	RS1	DS1	RS2	DS2
Does (>1year)				
LH1	-11.1±0.00	-2.2±0.00	15.2±0.00	24.2±0.00
LH2	-22.7±17.10	63.9±25.60	-22.7±27.03	-2.2±12.18
LH3	-2.7±15.28	5.5±17.96	10.0±16.26	27.5±17.63
UM1-4	26.8±16.49	8.5±12.80	-18.7±11.85	6.2±15.21
ALL	11.4±10.30	12.4±9.68	-12.7±9.06	9.8±10.43
Bucks (>1year)				
LH1	-	-	-	-
LH2	-	-	-	-
LH3	9.6±30.10	42.8±23.02	31.5±22.83	7.7±3.30
UM1-4	-	-	-28.0±60.22	37.0±17.25
ALL	9.6±30.10	42.8±23.02	1.8±31.40	25.3±11.91
Young males&females (6mo-1yr)				
LH1	-	-	-	-
LH2	33.3±17.78	43.5±15.22	-12.0±7.61	-
LH3	-	-	-	-
UM1-4	43.0±12.26	31.9±13.90	6.5±25.26	42.2±11.33
ALL	40.9±9.93	34.0±11.52	0.4±16.56	42.2±11.33
Juveniles (<6months)				
LH1	-	43.5±0.00	28.3±0.00	61.5±4.58
LH2	62.2±4.63	66.1±11.22	18.1±7.57	65.6±16.36
LH3	-62.1±94.81	79.3±14.70	31.5±6.73	54.7±17.79
UM1-4	69.2±16.71	68.8±10.72	35.8±7.24	26.4±18.25
ALL	41.9±23.27	69.8±6.74	32.7±5.16	36.6±13.52

Table S6: Seasonal mean weight changes (g/d) for sheep males and females (>1 year), young males and females (6-12 months) and juveniles (<6 months) sheep across the three agro-ecological zones in Bomet County

BOMET/AEZ	RS1	DS1	RS2	DS2
Does (>1year)				
LH1	37.5±14.38	-6.1±30.25	-7.3±9.53	-16.0±22.25
LH2	84.4±0.00	25.0±51.09	-11.1±15.82	24.9±13.98
LH3	40.0±10.96	63.0±7.84	22.1±24.48	13.2±32.97
UM1-4	-3.6±16.37	10.5±19.36	-14.3±11.89	9.3±25.12
ALL	29.1±9.96	1.9±14.72	-7.6±6.62	3.2±12.98

Bucks (>1year)				
LH1	-	-	100.0±0.00	-
LH2	-	73.9±0.00	-	96.7±0.00
LH3	28.9±0.00	18.5±59.78	123.9±0.00	118.7±0.00
UM1-4	28.9±0.00	12.3±46.26	112.0±11.96	107.7±10.99
ALL				
Young males&females (6mo-1yr)				
LH1	140.0±0.00	-	45.7±0.00	37.4±0.00
LH2	31.1±0.00	54.3±0.00	-	41.8±0.00
LH3	104.4±0.00	-	-	-
UM1-4	-	17.4±0.00	-	-
ALL	91.9±0.00	35.9±18.48	45.7±0.00	39.6±2.20
Juveniles (<6months)				
LH1	72.2±26.44	71.7±6.64	57.2±0.00	78.0±26.01
LH2	-	-	-	103.3±0.00
LH3	113.3±0.00	134.8±40.5	-	105.5±10.99
UM1-4	113.3±0.00	113.8±40.5	73.9±10.98	37.9±10.21
ALL	85.9±18.84	98.8±18.38	66.8±8.06	73.4±12.63

Table S7*: Seasonal mean weight changes (g/d) for sheep males and females (>1 year), young males and females (6-12 months) and juveniles (<6 months) sheep across the three agro-ecological zones in Nyando District*

NYANDO/AEZ	RS1	DS1	RS2	DS2
Ewes (>1year)				
UM2	0.6±31.55	36.7±2.89	-36.0±16.28	32.6±2.36
UM5	20.9±6.81	-6.1±5.76	-10.5±5.01	-6.2±5.92
LM2	7.5±8.75	17.7±11.27	-63.0±15.40	16.8±7.21
ALL	16.5±5.39	1.4±5.12	-21.1±5.49	1.0±4.95
Rams (>1year)				
UM2	-	-	-	-
UM5	49.6±0.00	-62.7±45.72	-36.8±16.36	-15.6±0.00
LM2	-	-	-	-
ALL	49.6±0.00	-62.7±45.72	-36.8±16.36	-15.6±0.00
Young males&females (6mo-1yr)				
UM2	55.7±43.75	-4.032.00	-11.2±0.00	26.5±0.00
UM5	-1.7±36.45	31.1±7.36	-22.8±18.09	21.3±11.57

LM2	-	-	-	-
ALL	14.7±28.91	19.4±12.03	-19.0±11.13	23.0±6.90
Juveniles (<6months)				
UM2	-	-	53.9±0.00	-
UM5	44.4±11.96	63.9±10.82	41.4±5.97	64.6±10.60
LM2	65.5±22.18	60.7±3.57	2.6±0.00	65.9±0.00
ALL	53.4±11.38	63.5±9.66	40.6±5.73	64.7±9.75

Table S8*: Seasonal mean weight changes (g/d) for goats' males and females (>1 year), young males and females (6-12 months) and juveniles (<6 months) sheep across the three agro-ecological zones in Nyando District*

NYANDO/AEZ	RS1	DS1	RS2	DS2
Does (>1year)				
UM2	19.3±9.69	6.6±11.14	-9.7±17.31	10.8±12.51
UM5	23.1±9.98	-6.6±6.73	-9.3±7.66	-6.8±7.47
LM2	7.3±7.49	28.6±7.77	-34.1±6.84	23.8±8.38
ALL	13.6±5.20	13.7±5.18	-22.1±5.21	11.9±5.56
Bucks (>1year)				
UM2	50.0±40.09	-51.0±0.00	-15.4±0.00	-48.9±0.00
UM5	8.2±6.26	21.8±0.00	25.0±0.00	24.5±0.00
LM2	34.9±25.15	12.0±8.18	14.3±18.88	13.1±9.33
ALL	35.8±20.25	-1.3±17.07	9.5±11.61	0.5±17.11
Young males&females (6mo-1yr)				
UM2	52.1±0.44	28.6±0.00	-	-
UM5	38.3±19.80	29.6±8.09	5.3±6.10	30.9±8.12
LM2	16.9±9.49	53.5±8.00	18.5±3.96	65.9±9.60
ALL	31.9±8.56	42.9±6.02	12.8±3.66	48.4±7.74
Juveniles (<6months)				
UM2	37.3±7.24	49.6±3.73	31.3±6.71	61.8±9.42
UM5	49.0±9.07	24.1±9.42	37.4±6.37	20.3±10.72
LM2	45.4±4.91	48.1±5.59	12.2±6.06	51.5±6.86
ALL	43.8±3.68	40.4±4.44	26.4±3.92	42.2±5.81

Table S9*: Proportion contribution and dry matter digestibility (%DMD) of feedstuff in the feed-basket for Lower Highland 1, 2 and 3 (LH1, LH2 and LH3) and Upper Midlands 1-4 (UM1-4) agro-ecological zones in Bomet County*

Agro-Ecological Zone	Feedstuff	Season 1			Season 2			Season 3			Season 4		
		Proportion (%)	% DMD	% DMD Intake	Proportion (%)	% DMD	% DMD Intake	Proportion (%)	% DMD	% DMD Intake	Proportion (%)	% DMD	% DMD Intake
LH1	Pasture	39.7	66.00	26.2	56.9	62.8	35.7	64.7	63.7	41.2	64.7	63.8	41.3
	Napier	33.0	60.98	20.1	23.6	61.0	14.4	30.3	61.0	18.5	31.0	61.0	18.9
	Rhodes grass	3.3	50.62	1.7	2.4	50.6	1.2	3.0	50.6	1.5	3.1	50.6	1.6
	Maize Stover	22.8	54.32	12.4	16.3	54.3	8.8	na	na	-	na	na	-
	Banana Pseudo stems	1.0	64.42	0.6	1.0	64.4	0.6	1.0	64.4	0.6	1.0	64.4	0.6
	Sweet potato vines	1.0	70.22	0.7	1.0	70.2	0.7	1.0	70.2	0.7	1.0	70.2	0.7
	Total	**100.0**		**61.7**	**100.0**		**61.5**	**100.0**		**62.6**	**100.0**		**63.1**
LH2	Pasture	31.3	66.11	20.7	53.8	62.0	33.4	64.7	63.9	41.4	75.4	63.3	47.7
	Napier	21.0	60.06	12.6	14.2	60.1	8.5	28.4	60.1	17.0	19.7	60.1	11.9
	Rhodes grass	4.6	48.94	2.2	3.1	48.9	1.5	6.2	48.9	3.0	4.3	48.9	2.1
	Maize Stover	42.5	58.99	25.1	28.6	59.0	16.9	na	na	-	na	-	
	Banana Pseudo stems	0.6	67.66	0.4	0.4	67.7	0.3	0.8	67.7	0.5	0.6	67.7	0.4
	Total	**100.0**		**61.0**	**100.0**		**60.5**	**100.0**		**61.9**	**100.0**		**62.1**
LH3	Pasture	35.9	66.04	23.7	56.1	64.6	36.2	71.1	65.3	46.4	73.2	62.8	45.9
	Napier	16.8	60.40	10.2	11.5	60.4	7.0	19.4	60.4	11.7	18.0	60.4	10.8
	Rhodes grass	8.9	54.28	4.8	6.1	54.3	3.3	9.5	54.3	5.2	8.8	54.3	4.8
	Maize Stover	38.4	58.40	22.4	26.3	58.4	15.4	na	na	-	na	na	-
	Total	**100.0**		**61.1**	**100.0**		**61.8**	**100.0**		**63.3**	**100.0**		**61.6**
UM1-4	Pasture	32.8	66.49	21.8	45.9	62.1	28.5	59.0	66.1	39.0	70.7	65.2	46.1
	Napier	23.8	62.95	15.0	19.1	62.9	12.0	33.6	62.9	21.1	23.7	62.9	14.9
	Rhodes grass	4.8	48.79	2.3	3.8	48.8	1.9	6.7	48.8	3.3	5.1	48.8	2.5
	Maize Stover	38.2	60.75	23.2	30.7	60.7	18.7	na	na		na	na	

Banana Pseudo stems	1.0	65.42	0.7	1.0	65.4	0.7	1.0	65.4	0.7	1.0	65.4	0.7
Total	**100.0**		**62.9**	**100.0**		**61.8**	**100.0**		**64.1**	**100.0**		**64.1**