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Can tropical legume grass forage reduce enteric methane yield from suckler cows in the Sahel?

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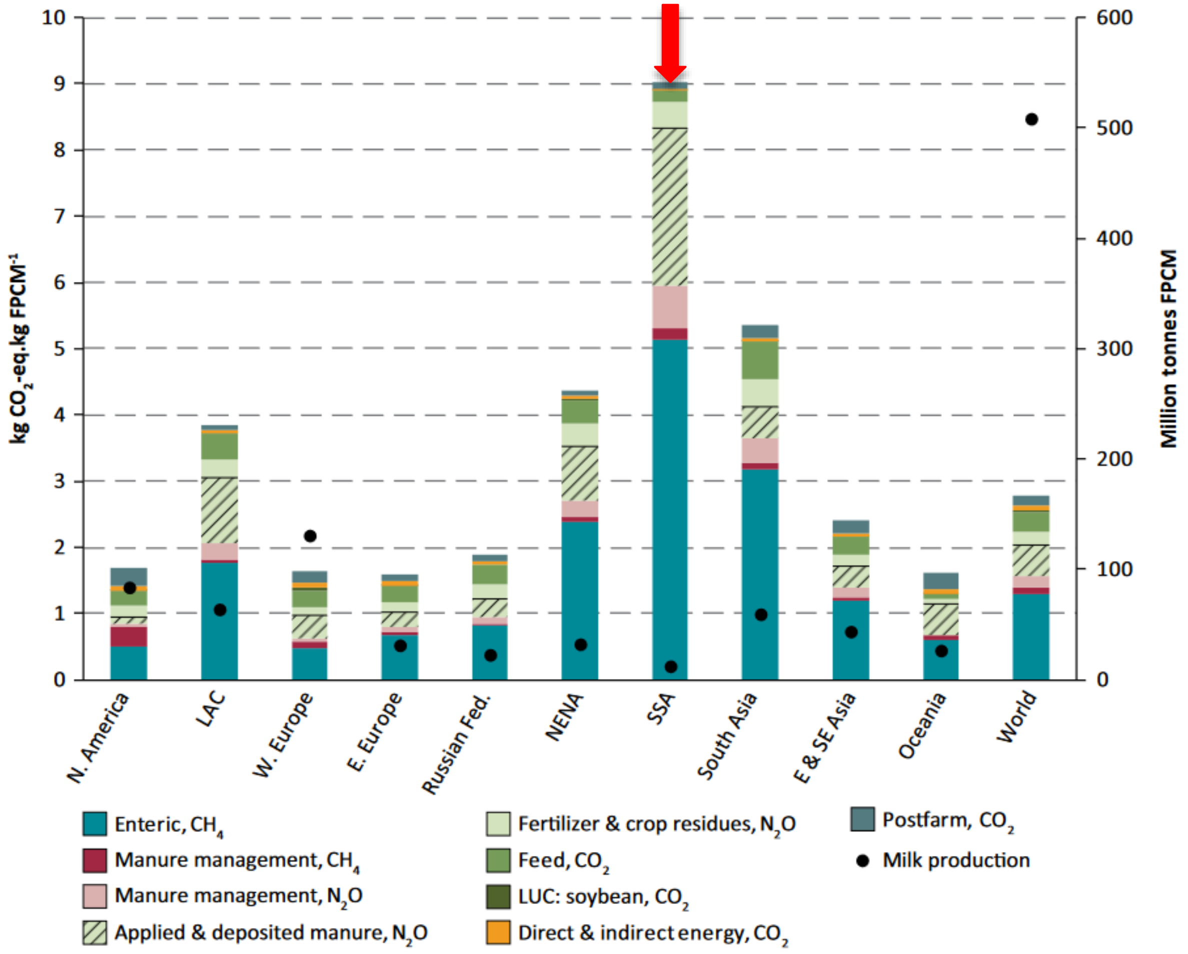
Environmental challenges in tropical livestock systems

Gerber *et al*, 2013

Livestock sector is a significant contributor to global human-induced GHG emissions and accounts for 14.5% of these emissions

Environmental challenges in tropical livestock systems



Sub-Sahara African (SSA) livestock (pastoral and agropastoral) systems suffer from a criticism because their environmental impact appears high when GHG emissions are expressed per kg of product (milk, meat), due to their limited productive efficiency.

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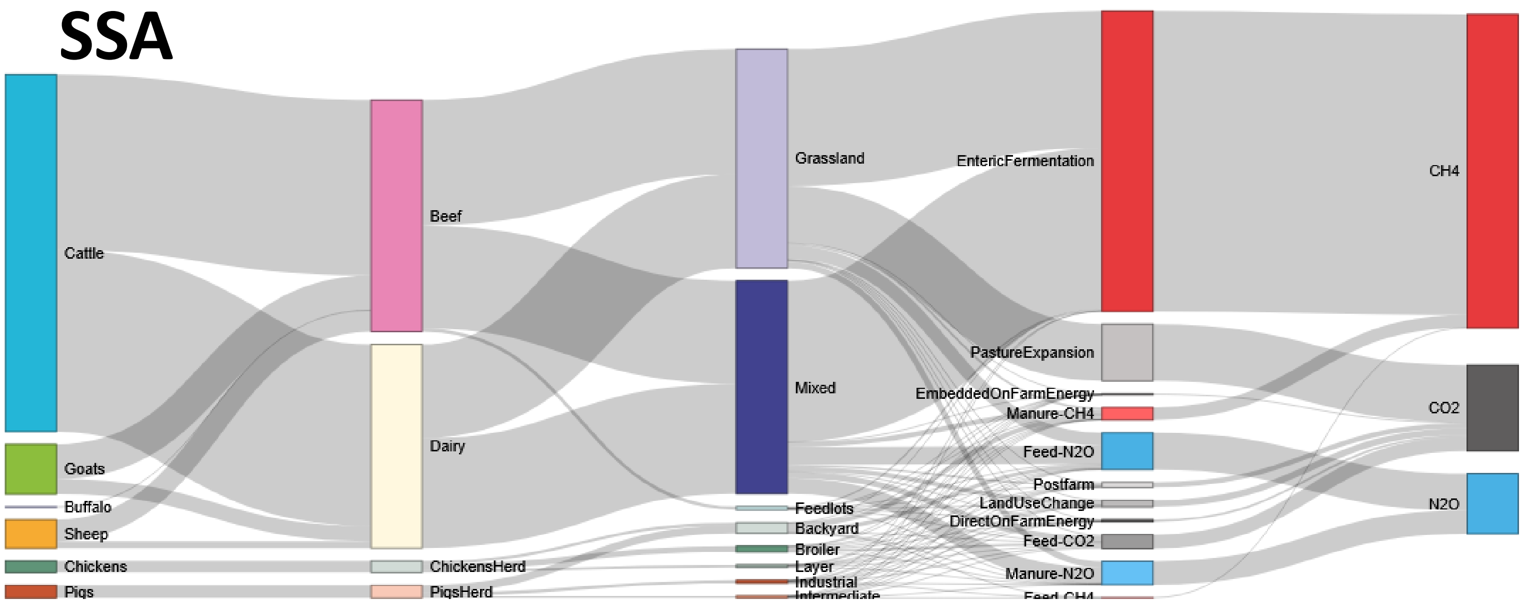
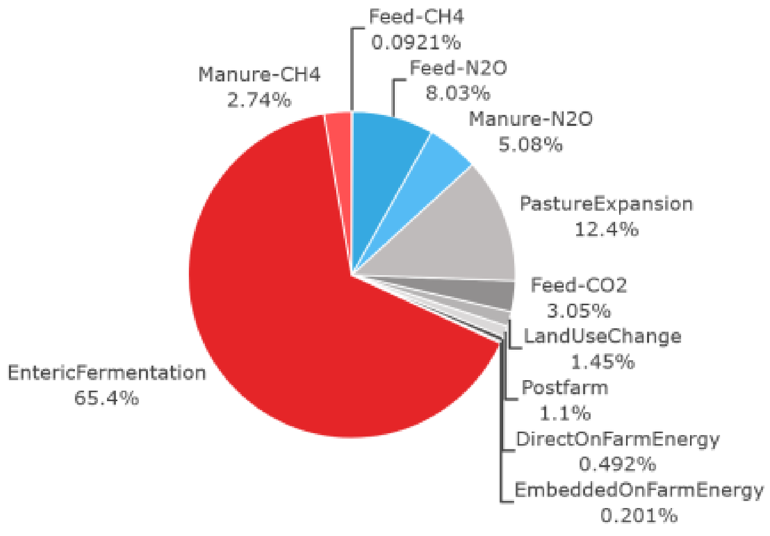
Environmental challenges in tropical livestock systems





FAO 2022

Enteric emission rates are also high because of the low overall quality of forage resources and their seasonal variability.

Very few references with in-vivo measurements are available on local breeds, particularly on suckler cows

Environmental challenges in tropical livestock systems

To improve livestock productivity in Africa, sustainable solutions to seasonal deficiencies in feed availability and quality are required

Mitigation strategies of enteric methane (CH_4) by changing the feed composition by using legume forage species remains an adapted approach to lessen enteric methane levels in SSA.

Environmental challenges in tropical livestock systems

A number of pasture legumes such as Macroptilium (Siratro), Centrosema, Desmodium, Puero and Glycine have been tried in Africa but these are of minor importance compared with those from the genus Stylosanthes (stylo).

Stylosanthes hamata, in the family Fabaceae and introduced as a forage crop to several West African countries (Gambia, Burkina Faso, Benin…)

The advantage of using Stylosanthes as a protein resource is the high yield of protein per hectare when the crop is harvested several times in one growing season

Our Study

Goal: Evaluate the impact of protein supplementation with a legume grass fodder (*Stylosanthes hamata*) on enteric methane emissions in Sudanese Zebu suckler cows.

Hypothesis: Stylosanthes hamata supplementation reduces enteric methane yield and emission intensity

Experimental design

Cattle Barn at CIRDES BF

5 suckler cows (75 months,LW= 204±13.3 kg) with their calves

5 steers (38 months, LW=179±20.3 kg)

GF syst for animals with horns

Two trials:

- ***R1:*** *Bracharia ruziziensis* (100)
- **R2:** *Bracharia ruziziensis + S. hamata* (75:25)

Experimental design

For each ration, the trial lasted 4 weeks (two weeks of feed adaptation and two weeks of data collection)

Activities	Hours																						
	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00
Feed distribution																								
GF Visits																								
Feces collection																								
Feeds and feces sampling																								

Results

	R1				R2				p-value
	Min	Mean	sd	Max	Min	Mean	sd	Max	
DMI (g DM/kg LW)	13.91	15.68[b]	2,70	19.51	17.76	**20.33[a]**	4.28	30.22	<0.001***
DMI (g DM/kg $LW^{0.75}$)	53.09	61.00[b]	6.41	74.14	67.91	**82.62[a]**	14.45	115.00	<0.001***
DMd (%)	0.48	0.52[b]	0.05	0.55	0.43	**0.58[a]**	0.06	0.64	0.042

Protein supplementation with *S. hamata L.* increases the DM intake (g/kg LW) for 30%, the digestibility (%) for 11%

Results

	R1				R2				p-value
	Min	Mean	sd	Max	Min	Mean	Sd	Max	
Daily milk production (L)	2.36	2.49[b]	0.13	2.63	2.35	**2.87[a]**	0.33	3.43	<0.001***
Daily milk production (Kg)	2.82	3.00[b]	0.18	3.15	2.80	**3.46[a]**	0.40	4.12	<0.001***
Daily milk yield (g/Kg DMI)	696.73	917.29[b]	138.75	1140.75	512.24	**765.96[a]**	147.63	1039.65	<0.001***

Protein supplementation with *S. hamata L.* increases the Milk production for 11%

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Results

Paramètres	R1				R2				*P-value*
	Min	Moy	Sd	Max	Min	Moy	Sd	Max	
CH_4(g/d)	**60.71**	**84.12**	**12.97**	**103.81**	**76.36**	**95.19**	**14.74**	**125.13**	**0.382**
CH4 (g/kg LW)	0.28	0.41	0.06	0.50	0.33	0.46	0.08	0.60	0.598
CH_4 (g/kg DMI)	**16.59**	**25.05[a]**	**4.84**	**32.36**	**11.98**	**20.99[b]**	**4.47**	**27.24**	**0.017**
CH_4 (g/kg of Milk)	42.41	62.39	11.78	80.84	38.79	48.43	9.13	70.46	0.002
CH_4 (kg/UBT/an)	25.28	37.70	5.66	45.47	30.43	41.69	7.23	54.24	0.595

Protein supplementation with *S. hamata L*. reduces eCH4 yield (g/kg DMI) for 16%

Message

In SSA, there is a very large diversity of ruminant feed resources with a potential for mitigating enteric methane emissions.

S hamata is one of these resources that can address both climate change and livestock production issues.

Continuing research to propose alternative feeding practices to farmers and decision-makers for sustainable ruminant breeding in SSA.

Carry out a cost-benefit analysis of different enteric methane mitigation strategies

Thanks for your attention

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