Improving the utilization of sugarcane (*Saccharum officinarum* L.) tops in goats: effect of supplementation with *Dichrostachys cinerea* fruits.

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Introduction

- Expansion of sugar cane fields has reduced grazing land in the Lowveld.
- Remaining grazing land (mostly thornveld with *Acacia* & other tree spp.) – low carrying capacity.
- Livestock is still important for sugar cane farmers in the Lowveld.
- For a sustainable crop-livestock farming system – need to integrate sugar cane farming with animal farming.

Introduction

- Cheap, locally available feed resources
  - Sugar cane tops & molasses.
    - Burnt tops from commercial cane – currently being ploughed back into the soil.
    - Generally regarded as a reject of no commercial value.
  - Tree fruits & leaves from thornveld.
    - *Dichrostachys cinerea* and *Acacia nilotica*.
    - Currently being utilized *in-situ* by livestock.
- The combined feed value of these resources is largely unknown.
- Study designed to investigate the possibility of utilizing sugar cane tops in combination with tree fruits to support ruminant livestock.

Objectives

- Determine the chemical composition and *in vitro* fermentation of sugar cane tops (N19 & N23) and *D. cinerea* fruits.
- Assess the utilization of sugar cane tops in combination with *D. cinerea* fruits as protein supplements.
- Compare the effect of *D. cinerea* fruits and conventional protein supplements on intake of sugar cane tops and N metabolism.

Material and methods

- Material
  - Burnt cane tops (N19 & N23) & dry, mature *D. cinerea* fruits obtained from a site in Swaziland's Lowveld.
- Chemical analyses
  - DM, OM, CP, NDF and ADF (Van Soest *et al.*, 1991)
- *In vitro* fermentation
  - The RPT (Mauricio *et al.*, 1999).
  - End-point iDMD & iOMD determined at end of incubation

Material and methods

- Nutrient metabolism study
  - 21 days adaptation period & 7 days collection period.
  - 16 castrated Small East African goats.
  - 4 weight-blocks of 4 animals.
  - 4 diets randomly allocated to each block.
  - Diets
    - Cane tops without any supplement.
    - Cane tops + urea & molasses.
    - Cane tops + fishmeal.
    - Cane tops + *D. cinerea* fruits.
  - Parameters measured: Intake, DM, NDF & ADF digestibility and protein retention.

Statistical analyses

- Intake, digestibility and protein retention data were analyzed using the general linear models (GLM) procedure of SAS.
  - Completely randomized block design.
- Questions
  - Does feeding cane tops in combination with protein supplements improve protein retention in goats?
  - Is there any difference in the utilization of cane tops when supplemented with *D. cinerea* fruits or conventional N sources?

Results and Discussion

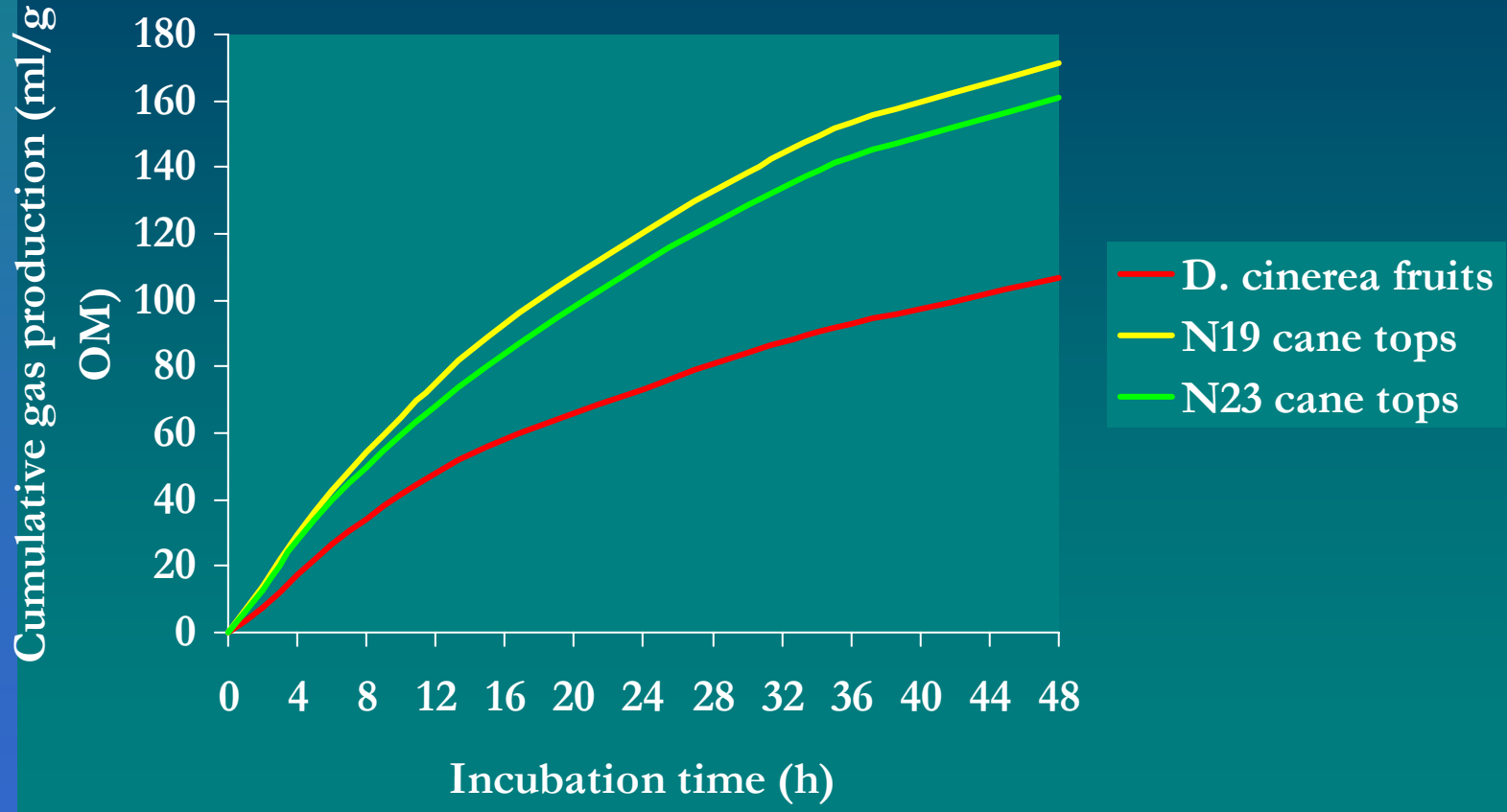
Chemical composition (g/kg) of feedstuffs

Feedstuff	NDF	ADF	CP
D. cinerea	439.4[b]	315.1[b]	129.0[b]
Fishmeal	37.2[a]	10.3[a]	559.1[c]
N19 tops	623.8[c]	333.2[b]	33.4[a]
N 23 tops	625.5[c]	342.9[b]	38.3[a]

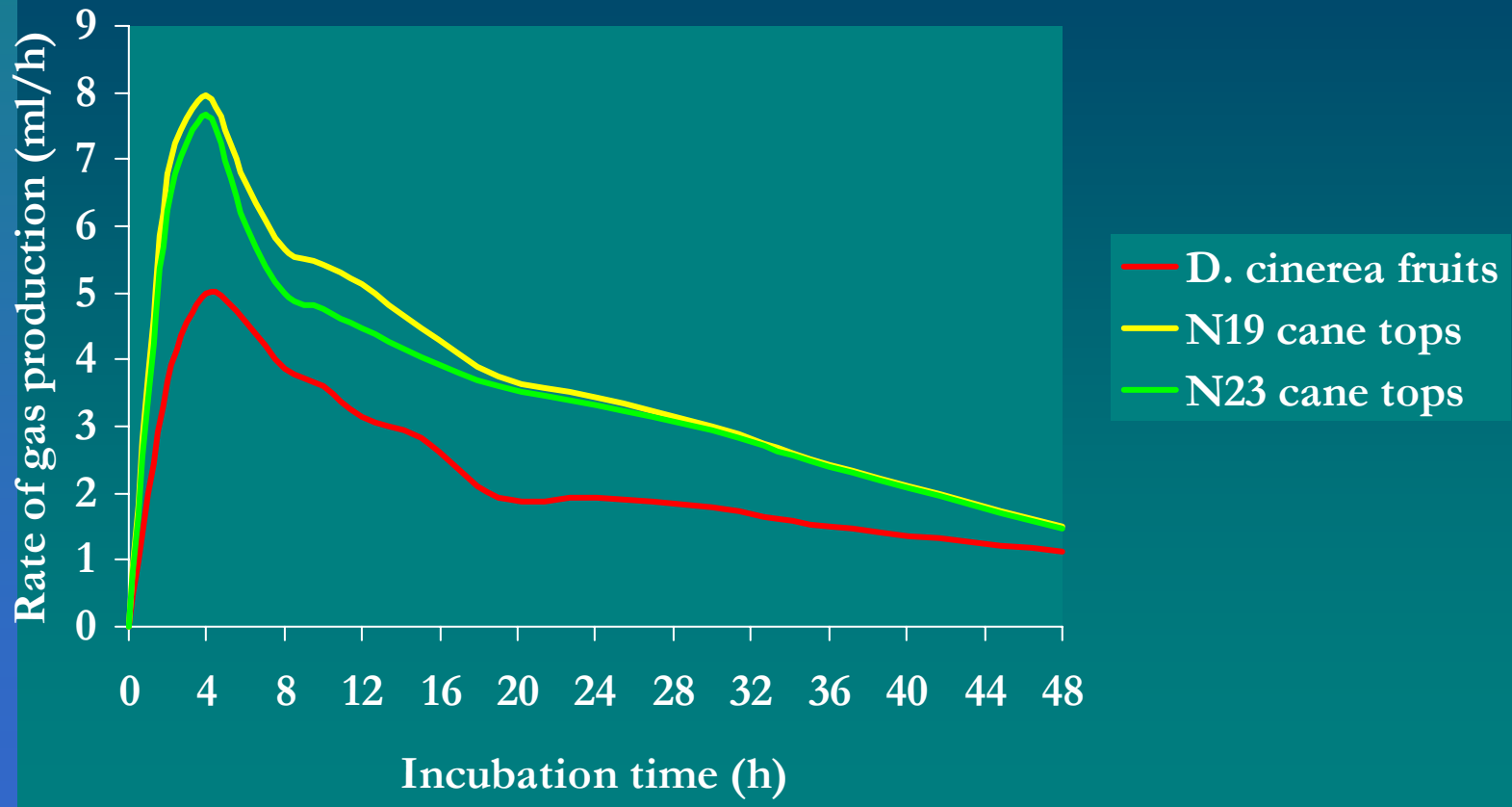
In vitro fermentation parameters

Feedstuff	48h gas	iOMD (mg/g OM)	PF (mg iOMD/ml gas)
D. cinerea	106.7[a]	450.1[a]	4.3[a]
N19 tops	171.4[b]	490.3[b]	2.8[b]
N23 tops	161.0[c]	489.8[b]	3.0[b]

Cumulative gas production profiles



Rate of gas production profiles



Nutrient metabolism

		Supplements			
	Cane tops	*D. cinerea* fruits	Molasses + urea	Fishmeal	SEM
Intake (g/d)	589.4^{b}	656.3^{c}	557.8^{ab}	516.9^{a}	26.79
DM digestibility	0.6^{b}	0.63^{b}	0.53^{a}	0.65^{b}	0.034
NDF digestibility	0.66^{b}	0.72^{b}	0.58^{a}	0.70^{b}	0.037
ADF digestibility	0.63^{a}	0.63^{a}	0.61^{a}	0.66^{a}	0.038
Protein retention (g/d)	-2.8^{a}	9.6^{d}	5.0^{c}	0.5^{b}	1.14

Conclusions and recommendations

- Cane tops are inadequate as a sole feed for goats
  - Feeding cane tops alone - poor productivity as animals will lose condition.
- *D. cinerea* tree fruits have moderate protein levels
  - Promote higher protein gain compared to urea and fishmeal when used in sugar cane tops basal diets.

Further Research

- On-farm studies with large ruminants
  - Feeding cane tops + supplements to dairy cows, beef and draught animals.
- Investigate potential of other locally available protein supplements
  - *Acacia nilotica* fruits and marula seed cake

Sustainable crop-livestock farming

Acknowledgements

- Dr. Fergus L. Mould – The University of Reading
- UNISWA Research Board