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Evaluation of nutritional composition of tropical forages and relationship with fiber digestibility

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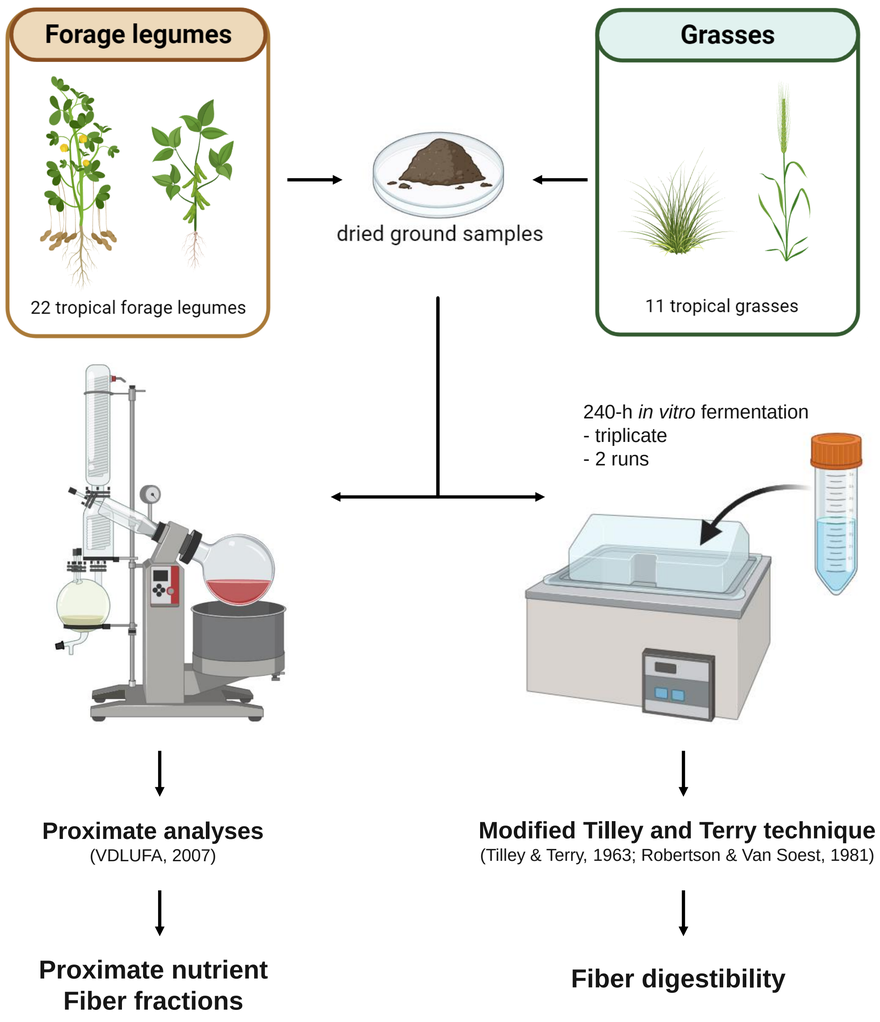
INTRODUCTION

- Low fiber digestibility in tropical forage legumes (TFL) may reduce feed intake when included in ruminant diets at > 400 g/kg dry matter intake.
- Fiber digestibility is partly determined by nutritional composition of feedstuffs and thus be predicted by their concentrations of nutrient and fiber fractions.

OBJECTIVES

- To determine proximate nutrient and fiber concentrations as well as fiber digestibility of TFL
- To evaluate the relationship between proximate nutrient and fiber concentrations and fiber digestibility of TFL and tropical grasses (TG)

MATERIALS & METHODS



Pearson correlations and multiple linear regressions were determined using CORR and GLM procedures of SAS (V9.4, SAS Institute Inc., Cary, NC, USA).

RESULTS

Table 1. Concentrations of proximate nutrient and fibre fractions (g/kg dry matter), as well as fibre digestibility of tropical forage legumes and tropical grasses.

Variables		Type of forage	
		Tropical forage legumes (n= 22)	**Tropical grasses** (n= 11)
Crude protein	Means ± SD	198 ± 34	78 ± 24
	(range)	(149 - 251)	(43 - 121)
aNDFom	Means ± SD	361 ± 72	557 ± 62
	(range)	(219 - 492)	(418 - 631)
ADF	Means ± SD	276 ± 51	343 ± 64
	(range)	(161 - 357)	(235 - 441)
Lignin	Means ± SD	78 ± 18	41 ± 24
	(range)	(49 - 109)	(17 - 98)
$uNDF_{240}$	Means ± SD	215 ± 67	201 ± 63
	(range)	(113 - 376)	(125 - 308)
pdNDF	Means ± SD	146 ± 40	356 ± 63
	(range)	(75 - 216)	(235 - 473)
pdNDF proportion (g/g aNDFom)	Means ± SD	0.411 ± 0.104	0.640 ± 0.096
	(range)	(0.197 - 0.563)	(0.512 - 0.791)

ADF, acid detergent fiber expressed inclusive of residual ash; aNDFom, amylase–treated ash–corrected neutral detergent fiber with addition of sodium sulphite; pdNDF, potentially digestible neutral detergent fiber; $uNDF_{240}$, undigested neutral detergent fiber estimated after 240 h of *in vitro* incubation.

Relationship between proximate nutrient with fiber concentrations and fiber digestibility (r):

- The $uNDF_{240}$ concentration positively correlated with aNDFom, ADF, and lignin in TFL (0.84, 0.75, and 0.20) and TG (0.50, 0.59, and 0.25).
- In TFL, pdNDF proportion negatively correlated with aNDFom, ADF, and lignin (-0.34, -0.35, and -0.03).
- In TG, pdNDF proportion negatively correlated only ADF and lignin (-0.27 and -0.45).

Table 2. Multiple linear regressions between proximate nutrient and fiber concentrations and fiber digestibility in tropical forages.

Dependent variable	Regression equation [parameter estimates (standard error)]	*RMSE*	R^2	*P–value*
$uNDF_{240}$ concentration (g/kg dry matter)				
Tropical forage legumes (n = 22)	45 (272) - 0.6 (1.3) CP + 0.4 (0.7) aNDFom	39	0.71	<0.01
	33 (168) + 0.5 (0.5) aNDFom - 1.3 (2.1) Lignin	39	0.70	<0.01
Tropical grasses (n = 11)	-953 (637) + 13.1 (9.8) CP + 2.3 (1.1) aNDFom	44	0.67	0.04
pdNDF proportion (g/g aNDFom)				
Tropical forage legumes (n = 22)	420 (449) - 0.1 (1.2) aNDFom + 2.3 (5.7) Lignin	106	0.12	0.49
	426 (501) - 0.2 (1.8) ADF + 2.9 (7.1) Lignin	105	0.14	0.44
Tropical grasses (n = 11)	230 (225) + 5.0 (2.6) CP + 5.2 (4.6) Lignin	86	0.44	0.22

ADF, acid detergent fiber expressed inclusive of residual ash; aNDFom, amylase–treated ash–corrected neutral detergent fiber with addition of sodium sulphite; CP, crude protein; pdNDF, potentially digestible neutral detergent fiber; *P*-value, probability value significance levels; *RMSE*, root mean squared error; R^2, coefficient of determination; $uNDF_{240}$, undigested neutral detergent fiber estimated after 240 h of *in vitro* incubation.

CONCLUSIONS

- **Fiber digestibility is related to aNDFom and lignin concentrations in TFL and to CP and lignin concentrations in TG.**
- **Further research with a greater number of samples is needed to validate the relationship between proximate nutrient and fiber concentrations and fiber digestibility.**

References

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