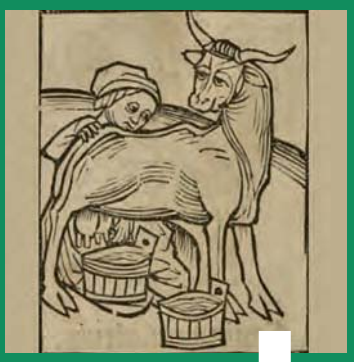
ISSN: 2772-283X



animal science proceedings

Proceedings of the 7th EAAP International Symposium on Energy and Protein Metabolism and Nutrition (ISEP 2022)

12th-15th September 2022
Granada, Spain

animal

August 2022
Volume 13
Issue 3

animal - science proceedings

The international journal for conference proceedings
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Aims and Scope
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Subject areas can include aspects of Breeding and Genetics, Nutrition, Physiology and Functional Biology of Systems, Behaviour, Health and Welfare, Livestock Farming Systems and Product Quality. Due to the integrative nature of biological systems, animal science proceedings will welcome contributions on the translation of basic and strategic science into whole animal and whole system Productivity, on Product Quality and the relationship between products and human health, Food Security, the Environment including ecosystem services and agroecology, and Climate Change. Proceedings can involve research, extension studies, training and education as well as policy development. The conferences can be international or regional/ national.

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Table 1
Nitrogen metabolism and its influence on water intake of crossbred Angus steers finished on either grass-fed or grain-fed finishing systems.

Item	Reference finishing diet[1]	Treatment		SEM[2]	*P*-Value[3]
		Grain-fed	Grass-fed		
Initial body weight, kg	384.5	385.9	383.6	10.8	0.88
Final body weight, kg	571.0	570.0	572.1	8.97	0.87
Water intake, L/day	-	39.9	68.3	0.57	<0.0001
N Requirements, g/day	142.0	156.0	159.0	1.13	0.46
N intake, g/day	232.0	199.0	456.7	3.32	<0.0001
Bacterial N, g/day	200.0	227.3	222.1	4.81	0.45
N excreted, g/day					
Feces	111.0	102.8	165.1	1.19	<0.0001
Urine	140.0	95.8	265.6	2.45	<0.0001
Total	250.0	198.7	430.7	3.41	<0.0001
N excretion, % N excreted					
Feces	44.2	51.9	38.4	0.16	<0.0001
Urine	55.8	48.1	61.6	0.16	<0.0001
N excretion, % of N intake					
Feces	47.8	51.7	36.3	0.23	<0.0001
Urine	60.3	48.0	58.4	0.54	<0.0001
RNB, g/d[4]	3.0	0.3	26.0	2.36	<0.0001
Net N utilization[5]	-7.8	0.3	5.3	0.71	<0.0001
N per water intake, g/L					
Intake	-	5.0	6.8	0.08	<0.0001
Feces	-	2.6	2.4	0.03	0.0003
Urine	-	2.4	3.9	0.06	<0.0001

[1] Finishing diet according to NASEM (2016).
[2] SEM: Standard error of the mean.
[3] $P \leq 0.05$: significant; $0.05 < P \leq 0.10$: trend.
[4] RNB (ruminal N balance) = [Crude Protein intake – (Rumen Undegradable Protein + Microbial Crude Protein)]/6.25}.
[5] (Intake of N − fecal N − urinary N)/intake of N.

Conclusion and Implications

The environmental impact of beef cattle operations has shifted consumption preferences of US consumers towards beef products perceived as more sustainable (i.e.: grass-fed). However, our study shows that grass-finished animals, with higher N intake, may have higher water requirements and consequently higher water utilization. This may be extended to highly productive systems that overuse N and overlook its effects on water. Altogether, our research shows that "greener" is not always necessarily better. Marketing of "greener" products should be evaluated cautiously and systematically to ensure that consumer views and sustainable production are aligned with empirical environmental impacts.

Funding

USDA-NIFA NEV00767, 2018-67016-27912, and 2019-69006-29329.

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doi: 10.1016/j.anscip.2022.07.050

O41 Chemical composition and the *in-vitro* fermentation of tropical fodder resources in Mauritius

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Keywords: Smallholder dairy farms; Fodder; Browse species; Chemical composition; *In-vitro* gas production

Introduction

The dairy sector in Mauritius relies heavily on the use of concentrates which impacts significantly on the production costs due to the increasing prices of feeds and feed ingredients. This may be a constraining factor to fresh milk production locally and, there is need to develop a sustainable and effective feeding recommendation package for the farming community. Smallholder farmers in Mauritius use cut and carry system for feeding their animals (Boodoo et al., 1999). Tree and browse species are important components of ruminant diets and are rich in most essential nutrients particularly, proteins and minerals. Little information is available on their nutritional worth. A sus-

tainable alternative to mitigate the high price of concentrate is to replace part of the costly concentrate with a cheap source of locally available resource in the diet of ruminants.
The objective of this study was to investigate chemical composition and the *in-vitro* rumen fermentation kinetics of the forages available locally and propose a partial replacement of concentrate by browse species.

Material and Methods
A survey was conducted in 2020, and fodder samples were collected from 132 randomly selected smallholder farms located in the agro-climatic zones of the country over a period of 12 months. Fodder samples were dried at 52 °C for dry matter (DM) and ground to 3 and 1 mm for chemical analysis and *in-vitro* gas production, respectively.

A. Chemical analysis

Chemical analysis of crude protein (CP), crude fibre (CF), acid detergent fibre (ADF), neutral detergent fibre (NDF), lignin (ADL), ether extract (EE), calcium (Ca) and phosphorus (P2O5) was performed according to AOAC (1990) and Van Soest et al. (1991).

B. *In-vitro* studies

The fodder samples were evaluated using the in vitro gas production technique, Menke and Steingass (1988). The samples were incubated alone and in mixture. Diets were also formulated replacing 50% of the concentrate with each of the browse species such that the ratio of sugarcane tops: concentrate: browse species was 60:20:20. Cumulative gas production data were fitted to the model of Ørskov (2000).

Results and Discussion
Farmers collected a wide range of fodder consisting of sugar cane top, native grasses, leaves and branches from trees and browses use as the basal diet. However, most farmers (85%) offered browse species. In addition, 95% of farmers used commercial concentrates as supplement to the basal diet. The chemical composition of the feeds is given in Table 1.
Sugar cane tops and native grasses had low crude protein (CP) contents of 5.7% and 4.2% dry matter respectively. Trees and browse species such as acacia, gros feuilles and bois noir have higher CP contents, namely, 19.9%, 15.8% and 15.4% dry matter, respectively, comparable to commercial compounded concentrates (12 to17% CP), which can be used to replace partially the purchased concentrates.
There were significant ($P < 0.05$) differences in the fermentation pattern of the different grass and browse/shrub species.
Figs. 1 and 2 show the gas production of some grasses and shrubs species respectively.
The survey showed that rearing practices on smallholder dairy farms are satisfactory and that farmers can optimize on the use of browse/shrubs species as supplement to the basal fodder and for partially replacing commercial concentrates.

Table 1
Chemical composition of the feed.

Name of sample	Scientific name	% DM	CP	CF	EE	ASH	P2O5	Ca	ADF	ADL	NDF
Guatemala	*Tripsacum laxum*	33.20	6.73	35.73	1.48	6.03	0.36	0.18	44.08	5.13	70.28
Sugar cane tops	*Saccharum officinarum*	34.32	5.74	35.55	1.59	6.77	0.31	0.22	41.89	6.45	69.59
Herbe elephant	*Pennisetum purpureum*	31.60	9.81	33.82	1.35	10.82	0.26	0.33	45.31	7.34	70.41
Acacia	*Leucaena leucocephala*	38.53	19.94	26.19	2.63	8.29	0.38	1.33	33.39	12.12	40.99
Bois noir	*Albizia lebbeck*	42.04	15.48	28.06	4.02	8.18	0.25	1.68	34.26	11.80	46.14
Gros feuilles	*Litsea monopetala*	28.40	15.85	28.15	2.55	7.20	0.67	0.64	47.20	20.75	51.75
Concentrate		86.50	17.20	4.21	3.82	6.41	1.42	1.23	–	–	–

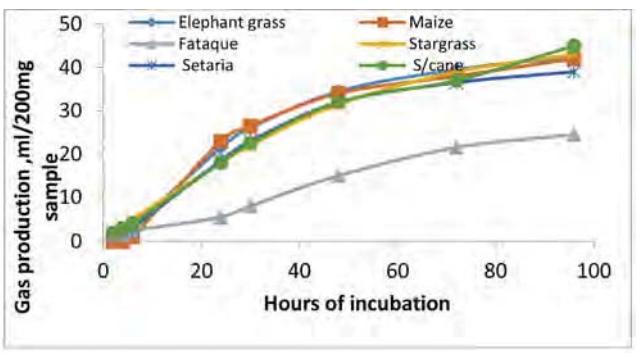

Figure 1: Gas production of grass species

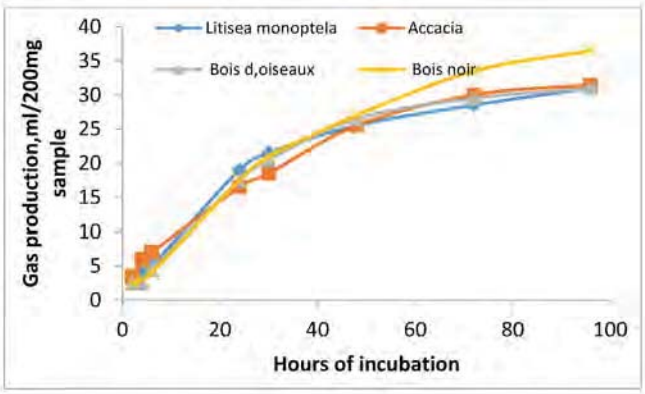

Figure 2: Gas production of browse species

Conclusion and Implications

The results obtained in this study provides nutritive value of the browse species and potential for replacing 50% of concentrates in the diet with browse species such as A. lebbeck and L. monopetala. With renewed interest in using shrubs/trees in ruminant feeding to reduce use of costly concentrate, more research is required for optimal introduction of these feed resources in feeding systems.

Acknowledgments

The authors gratefully acknowledge the support from the IAEA for the TC project MAR5025 under which the experiment was carried out and the management of FAREI for support of the project.

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doi: 10.1016/j.anscip.2022.07.051

O42 Changes in rumen volatile fatty acid production in response to the varying degradability of fibre and protein

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Keywords: Acetate; Beet pulp; Branched-chain volatile fatty acid; Soybean meal

Introduction

Volatile fatty acid (VFA) is one of the main end products of ruminal microbial digestion (France and Dijkstra, 2005) which plays a pivotal role by providing up to 72% of the total energy requirement (Bergman, 1990) of the animal. The majority of previous studies has focused on different dietary forage to concentrate ratio on rumen fermentation rather than the varying ruminal degradability of nutrients. Hence, the objective of this study was to examine the effect of different protein and fibre sources with varying ruminal degradability on rumen VFA concentrations.

Material and Methods

This experiment was approved by the Virginia Tech Institutional Animal Care and Use Committee (Protocol #20-175). Six ruminally cannulated wethers (74.32 ± 13.32 kg) were fed four dietary treatments; (a) lowly degradable fibre and lowly degradable protein based on timothy hay and heated soybean meal (TH + HSBM), (b) lowly degradable fibre and highly degradable protein using timothy hay and soybean meal (TH + SBM), (c) highly degradable fibre and lowly degradable protein using beet pulp and heated soybean meal (BP + HSBM) and (d) highly degradable fibre and highly degradable protein (BP + SBM). The experimental design was a partially replicated 4 × 4 Latin Square Design with a 2 × 2 factorial arrangement of diets, and the experiment consisted of four periods of 25 days each. During these periods, animals were allowed to consume treatment diets for 21 days prior to four days of sample collection. On each sample collection day, at 0800 h, each animal had a baseline rumen fluid sample collected and subsequently fed the entirety of their daily ration. Rumen fluid samples were collected from 0800 h (baseline) to 2400 h hourly, to characterise the fermentation curves associated with the treatment diets. Rumen fluid samples were stored at -21 °C until further analysis. Samples from hours 0, 3, 6, 9, 12, and 15 post-feeding were composited