Effect of different sources of non-protein nitrogen on the ciliated protozoa concentration in Nellore steers

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INTRODUCTION

- Protein : 75% of the feeding costs for ruminant ration;
- Soybean Meal (vegetable source) can be replaced by Non Protein Nitrogen in ruminant diets;
- Decrease costs in the ration;

INTRODUCTION

- Protozoa are influenced by energy and nitrogen source (Dennis et al., 1983).



HIPOTHESIS

- The replacement of soybean meal by non protein nitrogen (NPN) sources for feeding Nellore steers can increase the rumen protozoa concentration.

MATERIAL AND METHODS

Metabolism Trial

✓ 4 × 4 Latin square

✓4 ruminally cannulated Nellore steers (22 months and iBW=407 ± 11 kg)

✓4 TREATMENTS:

Control

Urea

Optigen

Optigen and Urea

MATERIAL AND METHODS

- ***TREATMENTS***

Ingredients (%)	Treatments			
	Control	Urea	Optigen	Ur+Opt
Sugar-cane bagasse	21.5	21.5	21.5	21.5
Corn	44.0	49.3	49.2	49.3
Soybean hulls	20.0	20.0	20.0	20.0
Soybean meal	12.1	6.1	6.1	6.1
Mineral salt	1.4	1.4	1.4	1.4
Urea	1.0	1.7	0.0	1.0
Slow release urea (Optigen)	0.0	0.0	1.8	0.7
Nutrients				
Crude Protein	13.03	13.05	13.38	13.14
Total Digestive Nutrients	66.8	66.7	67.2	67.8

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MATERIAL AND METHODS

Metabolism Trial

✓Twice Daily Feed : 8am and 4 pm

✓ 4 Periods of 21 days

✓ 14 days of adaptation

MATERIAL AND METHODS

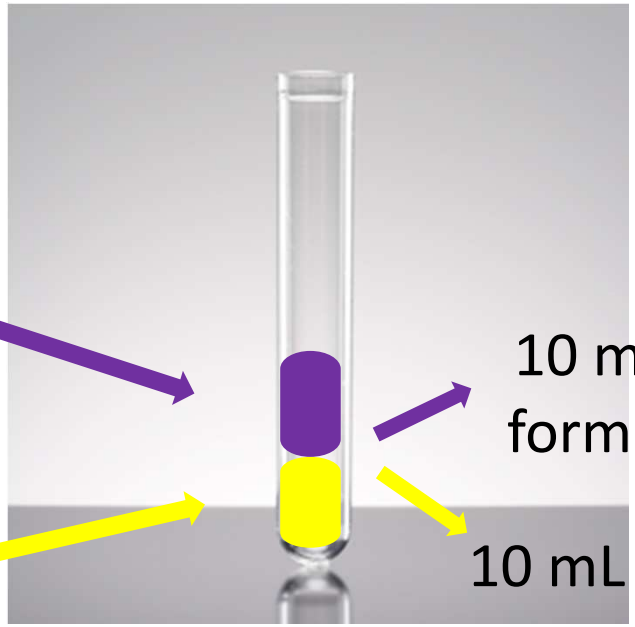
Protozoa Analysis

- - Ciliated Protozoa

- Collection of rumen content (3 different areas of rumen)
- measurement was done on the 17th day of each period
- before feed and 4 hours after feed

MATERIAL AND METHODS

Protozoa Analysis



10 mL of 37% formaldehyde

10 mL of ruminal content

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MATERIAL AND METHODS

Protozoa Analysis

- determinations were performed according to Dehority (2003) to determine the curves of the ciliate appearance with a counting chamber using a Sedgwick-Rafter with a capacity of 1 mL.

- **Quantification:** OPTICAL MICROSCOPE (0.4362 mm^2 of reticule area).

RESULTS

Ciliated Protozoa number (x10^4/mL) of ruminal content of Nellore steers with different times of feed.

PROTOZOA	TIME		STD	P
	0	4		
Entodinium	34.42	35.12	0.2317	0.044
Diplodinium	2.70	2.88	2.793	< 0.001
Epidinium	2.38	2.50	0.0277	< 0.001
Isotricha	2.77	2.94	0.0360	0.003
Dasytricha	2.59	2.69	0.0515	0.206
Ostracodinium	1.03	1.12	0.0253	0.016
Eudiplodinium	0.89	1.04	0.0188	< 0.001
TOTAL	46.79	48.25	0.227	< 0.001

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DISCUSSION

- After feeding the rumen microorganisms begin the digestion of food releasing substrates.

- With the increase of these substrates and appropriate conditions of pH an increase of rumen microorganisms is observed.

RESULTS

Ciliated Protozoa number (x10^4/mL) of ruminal content of Nellore steers according to the treatments.

PROTOZOA	TREATMENTS					CONTRASTS –*P* VALUE		
	Control	Optigen	Urea	Ur+Opt	STD	Control vs Others	Opt vs Uréia	Ur+Opt vs Urea
Entodinium	28.76	34.81	35.32	40.2	0.33	< 0.001	0.2894	< 0.001
Diplodinium	1.89	2.98	2.9	3.4	0.39	< 0.001	0.184	< 0.001
Epidinium	1.71	2.63	2.38	3.05	0.05	< 0.001	0.0011	< 0.001
Isotricha	2.11	3.01	2.72	3.59	0.05	< 0.001	0.0006	< 0.001
Dasytricha	1.81	2.75	2.55	3.45	0.07	< 0.001	0.0705	< 0.001
Ostracodinium	0.91	1.01	1.07	1.3	0.04	< 0.001	0.239	0.002
Eudiplodinium	0.718	0.838	0.971	1.26	0.03	< 0.001	0.0021	< 0.001
TOTAL	37.9	48.02	47.91	56.25	0.32	< 0.001	0.8108	< 0.001

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DISCUSSION

• Dennis et al. (1982) studied heifers fed diets that contained either urea or soybean meal as the nitrogen source and observed that urea supported a greater protozoa population than soybean meal.

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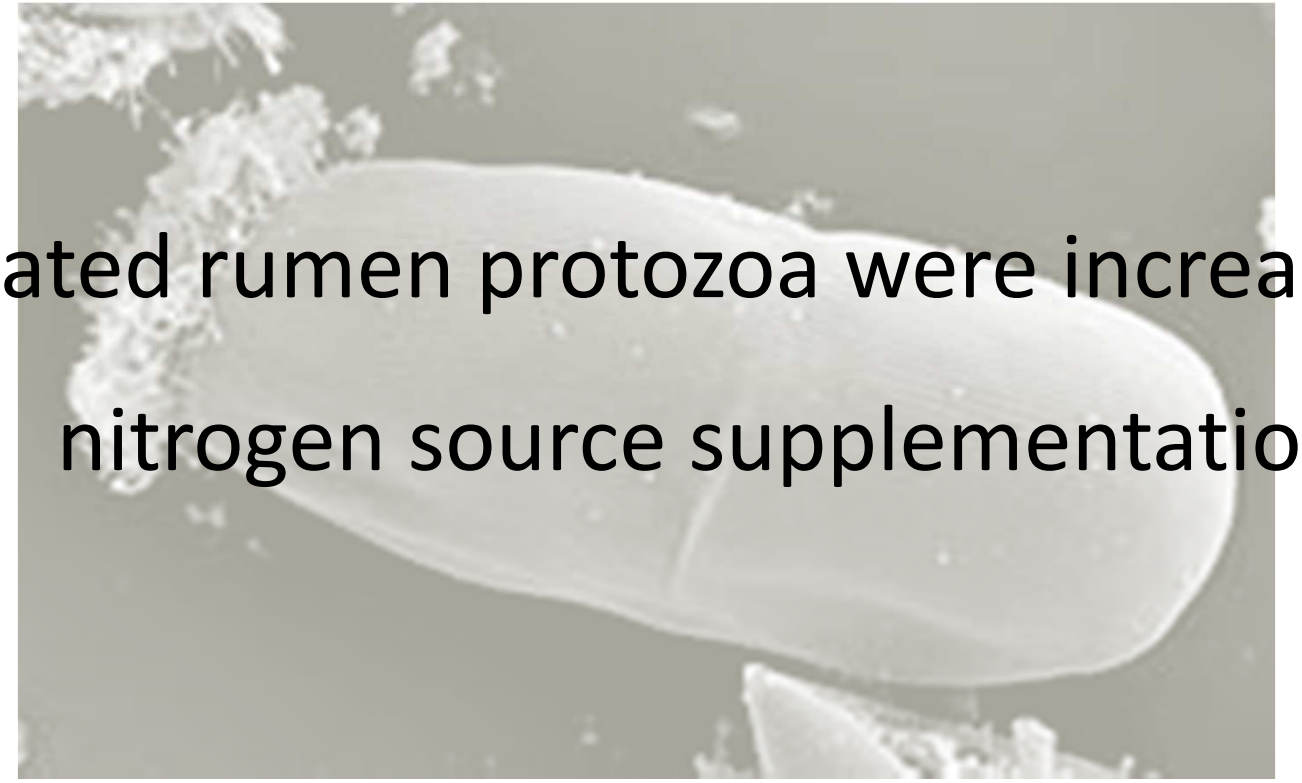
CONCLUSION



Ciliated rumen protozoa were increased by nitrogen source supplementation.



IMPLICATION

The presence of ciliated protozoa :

- Turnover of bacterial N in the rumen (engulfment and digestion of bacteria) (Coleman, 1975);
- Improve the ruminal N renovation (Dennis et al., 1983)
- Microbial protein synthesis;

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Sculpture by Fritz Røed, Sverd i fjell, 1983 - © Fritz Røed / BONO 2010

THANKS!!!!!!!!!

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