Effects of chitosan extracts on *in vitro* ruminal degradation and fermentation of rations differing in the forage to concentrate ratio.

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Introduction

Chitosan is a non-toxic and biodegradable carbohydrate polymer that has received much attention as a functional biopolymer for diverse applications in medicine and food preservation, due to its antimicrobial properties. The objetive of this work was to study effects of chitosans, with different molecular weights and deacetylation degrees, **on ruminal digestion and fermentation parameters of rations differing in the forage to concentrate ratio.**

Material and methods

➥ Additives and rations

☑ Chitosans 750 mg/l of culture fluid dose
☑ 3 rations differing in forage to concentrate ratio (Table 2)

Table 1. Physical characteristics of the tested additives

Additives				
Abbreviation	Commercial name	Deacetylation degree (%)	Viscosity (m Pa s)	Source
CHI1	75-200	75	200	Biolog, S.A
CHI2	85-200	85	200	Biolog, S.A
CHI3	Fg 95	>95	<500	Trades S.A.

Table 2. Ingredient and chemical composition of dietary treatments

	Diet		
	High forage	Medium forage	Low forage
Ingredient conposition (g/kg DM)			
Alfalfa hay	800	500	200
Wheat grain, ground	50	125	200
Corn grain	40	100	160
Soybean meal, 44%	48.3	120.75	193.2
Soybean hulls	20	50	80
Corn flour	18.56	46.4	74.24
Wheat DDG	10	25	40
Sugar beet molasses	6	15	24
Limestone (CO_3Ca)	3.34	8.35	13.36
Vitamin-mineral mix	1.2	3	4.8
Chemical composition (g/kg DM)[1]			
DM (g/kg)	920.22	914.70	909.18
OM	895.80	905.20	914.56
CP	198.00	205.95	213.90
NDF_{om}	380.04	351.15	322.26
ADF_{om}	247.02	193.05	139.08
FAT	20.20	25.15	30.01

➥ Procedures and Statistics

☑ Gas production technique. 24h incubations, in triplicate in two different periods.
☑ Parameters analyzed separately for ration with PROC GLM procedure of SAS

Results and conclusions

	pH	IVTOMD, g/kg	Total VFA, mmol/gDM	*Individual, mmol/100 mmol*				C3:C2	CH_4, mmol	VFA:TDS, mmol/gDM	$N\text{-}NH_3$, mg/100 ml
				Acetate	Propionate	Butyrate	BCVFA				
Ration											
High forage											
CTR	6.44	678	6.03	63.7	17.0	12.9	3.77	0.27	0.96	9.82	26.5
CHI1	6.53*	535*	5.53	62.3	21.4*	11.4	3.54	0.35*	0.81	11.36	14.5
CHI2	6.58*	516*	5.19	66.1	22.3*	8.1*	2.46*	0.34	0.76*	11.11	21.6
CHI3	6.60*	493*	5.58	63.0	23.6*	9.6	3.05	0.38*	0.79	12.87*	15.2
s.e.m	0.02	24.4	0.38	2.69	1.01	1.42	0.46	0.03	0.07	0.92	5.34
Médium forage											
CTR	6.49	755	6.10	63.7	18.3	12.9	3.12	0.30	0.97	8.81	19.7
CHI1	6.61*	613*	5.33	65.7	21.0	10.4	2.41	0.33	0.82	9.55	27.0
CHI2	6.57	607*	5.96	58.8	23.8*	13.3	3.41	0.41*	0.84	10.72*	36.1
CHI3	6.58*	588*	5.67	61.3	23.4*	11.8	3.01	0.39	0.81	10.54*	23.6
s.e.m	0.03	14.7	0.37	3.04	1.54	1.60	0.39	0.04	0.07	0.64	5.33
Low forage											
CTR	6.44	857	5.77	59.6	17.9	16.1	3.73	0.30	0.90	7.33	26.6
CHI1	6.47	727*	6.25	59.9	21.2*	14.7	3.36	0.36	0.94	9.35*	25.4
CHI2	6.47	723*	5.29	55.2*	27.0*	13.8	2.82*	0.49*	0.69*	7.95	30.4
CHI3	6.46	733*	5.66	54.9*	29.3*	12.1*	2.51*	0.54*	0.70*	8.37	26.0
s.e.m	0.02	9.7	0.31	1.61	0.97	1.19	0.27	0.02	0.05	0.45	5.32

✔ Chitosan resulted in a modification of fermentation pattern of rations differing in the forage to concentrate ratio, shifting fermentation to energetically more efficient routes.

✔ More promising results could be achieved in diets rich in concentrate.