mals in the Rocky Mountain regions of North America are particularly important. Such losses are, however, reduced when dietary adaptation leads to accelerated rates of metabolism of the compounds by ruminal microbes. A previously undetected group of nitro-toxin degrading bacteria from cattle rumen contents have now been isolated. Increased concentrations of these organisms were selected when diets containing the toxins were supplied, supporting the concept of their role in this adaptation [1]. These bacteria are obligately anaerobic, non-fermentative, non-motile, Gram-positive, non-sporing rods that obtain energy for growth via anaerobic respiration mechanisms. They require an electron acceptor, such as the nitro-toxins or other oxides of nitrogen, for growth. One strain, from the group of four isolates studied, reduced nitrate and nitrite, with ammonia as a product. When both nitrate and nitropropanol were available, biphasic growth occurred and nitrate was used for nitropropanol. A few other acceptors such as dimethyl sulfoxide or trimethyl amine-oxide also were used and the expected reduced products were recovered; however, various other potential acceptors that were tested, such as sulfate or fumarate, were not utilized. Electron donors that supported growth include hydrogen, formate and lactate, while none of a wide variety of carbohydrates or other potential electron donors were functional. Oxidized vs. reduced absorption spectra of cell-free extracts indicated the presence of a c-type cytochrome with absorption maxima at 411nm in the oxidized state and at 421, 523 and 554nm in the dithionite-reduced form. Analysis of the 16S rRNA gene sequence provided evidence that these are indeed novel organisms and a new genus and species is being proposed to accommodate them.

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RUMEN MANIPULATION

Effect of the microbial additive Levucell® SC on microbial activity in the rumen during the stepwise adaptation of sheep to high concentrate diet.

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Changes occuring in the rumen after excessive intake of starch have been extensively studied, but little is known about modifications during stepwise adaptation of animals from low to high concentrate diets. Since yeast cultures have been shown to stabilize the rumen pH, they could be used to improve the adaptation of the microbial ecosystem during the period of change to diets rich in cereals. The objective of this study was to monitor the enzyme activities of microorganisms as sheep adapted gradually from all-forage to high-barley diets and to evaluate the effect of including *Saccharomyces cerevisiae* CNCM I-1077, Paris (SC), in the form of a commercial product Levucell® during stepwise adaptation.

The effect of the addition of SC (10^7 cfu ml^{-1} of rumen content) was studied with four ruminally fistulated wethers in a 2 x 2 Latin square design. The animals received twice daily an initial diet of 90% hay and 10% soyabean meal. At weekly intervals and for five weeks, increasing

Total fibrolytic activities (g DM h^{-1}) in solid-associated microorganisms

Enzyme		*Barley (% DM)*						*Effect*	
		0	*20*	*35*	*55*	*66*	*SE*	*SC*	*SC x diet*
Xylanase	control	146	114	166	176	43	23	.0001	.04
	+ SC	168	136	199	147	117			
Avicelase	control	36	30	35	35	8	7	.88	.34
	+ SC	31	35	35	25	17			
β-D-Xylosidase	control	52	39	49	51	21	6	.02	.0001
	+ SC	50	46	57	41	34			
β-D-Glucosidase	control	31	27	39	50	20	6	.02	.05
	+ SC	28	36	45	40	36			

proportions of hay were replaced by ground barley until the final diet contained 24% hay, 66% barley and 10% soyabean meal. Samples of rumen digesta were collected before (only reported here) and 3h after morning feeding on two days of each adaptation week. Polysaccharidase and glycosidase activities of solid-associated microorganisms (SAM) were measured.

For animals without SC, fibrolytic enzyme activities of SAM were not modified between 0 and 55% barley in the diet, except a small decrease with the 20% barley diet. Beyond 55 % barley, all enzyme activities dropped, and particularly the polysaccharidase activities. The response of microbial activity to barley supplementation is quadratic. Addition of SC in the diet limited the decrease of fibrolytic activities of microorganisms, and may reduce the negative effects of cereal supplementation on cell wall digestion in the rumen.

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Effect of the addition of Levucell® SC* on the rumen microflora of sheep during adaptation to high starch diets. F Chaucheyras[1,2], L Millet[1], B Michalet-Doreau[3], G Fonty[1], G Bertin[2], P Gouet[1] ([1]*Laboratoire de Microbiologie, INRA,63122 Saint-Genès Champanelle;* [2]*Santel-groupe Agritek, 85 rue Anatole France, 92300 Levallois-Perret;* [3]*INRA, Station de Recherches sur la Nutrition des Herbivores, Centre de Clermont-Theix, 63122 Saint Genès-Champanelle, France)*

Previous reports have described the stimulatory role of microbial additives on the growth of lactate-utilizing and cellulolytic bacteria and on the rate of fibre breakdown in the rumen of animals adapted to their diets. However, information concerning their effects on microbial balance and activity during adaptation to high concentrate diets are scarce. The aim of this study was to investigate the effect of the additive LEVUCELL® SC (a strain of *Saccharomyces cerevisiae* CNCM I-1077, Paris) on ruminal microbial populations in sheep during adaptation to high starch diets.

Four rumen fistulated wethers were used in a 2x2 Latin square design, LEVUCELL® SC (10^7 cfu ml^{-1} of rumen content) was given daily to one group with the morning feed. The initial diet was a hay-soyabean meal mix (90:10). Then, at