

Total fibrolytic activities (g DM h<sup>-1</sup>) 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			
$\beta$ -D-Xylosidase	control	52	39	49	51	21	6	.02	.0001
	+ SC	50	46	57	41	34			
$\beta$ -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<sup>1,2</sup>, L Millet<sup>1</sup>,**

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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<sup>-1</sup> 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

## Effect of a yeast product on numbers of cellulolytic bacteria during adaptation

	% Barley in Diet	
	0	66
Total rRNA (µg)	Control	169.88
	LEVUCCELL*	179.28
Bacterial rRNA (µg)	Control	89.66
	LEVUCCELL	98.19
<i>F. succinogenes</i> bacterial rRNA	Control	8.28
	LEVUCCELL	7.92
<i>R. flavefaciens</i> rRNA as % bacterial rRNA	Control	4.74
	LEVUCCELL	4.43
<i>R. albus</i> rRNA as % bacterial rRNA	Control	1.31
	LEVUCCELL	0.90
		243.94
		293.08
		85.11
		50.11
		9.73 <sup>a</sup>
		14.85 <sup>a</sup>
		3.85 <sup>b</sup>
		7.73 <sup>b</sup>
		1.67
		2.20

<sup>a</sup> results are significantly different ( $P<0.03$ ) ; <sup>b</sup> results are significantly different ( $P<0.07$ )

\*LEVUCELL® is a registered trademark of AGRITEK Bio® and LALLEMAND Inc.

weekly intervals, for five weeks, the hay was progressively replaced by barley, such that the final diet contained 24% hay, 66% barley and 10% soyabean meal. Total anaerobic, amylolytic and lactate-utilizing bacteria were enumerated in selective media according to Hungate's roll tubes method. The populations of three cellulolytic bacterial species (*F. succinogenes*, *R. albus*, *R. flavefaciens*) were quantified using 16S rRNA-targeting probes. Results obtained with diets containing 0 and 66% barley are presented here.

From 0 to 66% barley, all bacterial counts increased in the control group. With 66% barley the addition of LEVUCELL® led to a decrease of all bacterial counts, particularly of amylolytic bacteria. Total rRNA increased from 0 to 66% barley, while there was a small decrease of bacterial rRNA in the control group. This decrease was much more pronounced in the presence of LEVUCELL®. The amounts of each

cellulolytic bacterial species rRNA remained approximatively equivalent whatever the treatments. Consequently, with 66% barley, the percentage of rRNA of each species relative to total bacterial rRNA was increased in the presence of LEVUCELL® (Table). These results suggested that LEVUCELL® SC was able to alter the microbial balance and to preserve the cellulolytic populations during adaptation to high amounts of rapidly fermentable carbohydrates in the diet.

**Effect of fibrolytic enzymes in barley-based diets on performance of feedlot cattle and in vitro gas production.** AD Iwaasa<sup>1</sup>, LM Rode, KA Beauchemin, S Eivemark ('Research Centre, Agriculture and Agri-Food Canada, P.O. Box 3000, Lethbridge, Alberta, T1J 4B1, Canada)

The objectives of this study were to: 1) determine if fibrolytic enzymes added to