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

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

[a] results are significantly different ($P<0.03$) ; [b] 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[1], LM Rode, KA Beauchemin, S Eivemark (*[1]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

grain diets enhance performance of feedlot cattle, and 2) determine if the in vivo response due to enzyme application could be predicted from in vitro gas production.

Sixty crossbred steers (476kg) were offered high concentrate diets, consisting mainly of barley (95% DM basis) and barley silage or straw. Concentrates were treated with three levels of enzyme preparation: 0 (Control); 1(E1); or 2(E2) l tonne^{-1} (Xylanase B, Biovance Technologies Inc., Omaha, Nebraska). Dry matter intake was lower (P<0.07) for cattle fed enzyme diets compared to the control diet (9.7 vs 10.4kg d^{-1} respectively). Dry matter digestibility (DMD) was higher (P<0.05) for E1 compared to E2 and the control (70.9 vs 66.1 and 67.6% respectively). Effects of enzyme addition on feed:conversion ratio (FCR) and DMD differed for barley+silage and barley+straw. For barley+silage there was a linear decline in FCR while DMD increased as enzyme levels increased. For barley+straw a quadratic decline (P<0.01) in DMD occurred as enzyme levels increased.

Enzyme-treated grains (Control, E1 and E2) were incubated with rumen fluid and gas production, total VFA production and acetate:propionate (A:P) ratios were analyzed after 48h. Enzyme treatments (E1 and E2) consistently increased gas production compared to the control. Similarly, E1 and E2 tended to have higher total VFA production (84.3 and 82.0 vs 80.6mM, respectively) and higher A:P (2.5 and 3.0 vs 2.2, respectively) than the control. Fibrolytic enzyme preparations improved the digestibility and performance of animals fed barley+silage diets. Measuring changes in gas production of enzyme-treated barley may be a useful and rapid technique to screen fibrolytic enzymes for their effects on animal performance.

Effects of fibrolytic enzymes (E) in barley-based diets containing silage or straw forage (F) on performance of feedlot cattle.

Item	*Barley+silage*			*Barley+straw*				*Significance*		
	Control	*E1*	*E2*	*Control*	*E1*	*E2*	*SE*	*F*	*E*	*F*E*
ADG, kg d^{-1}	2.0	2.1	2.2	2.1	1.9	1.9	0.1	NS	NS	NS
DMI, kg d^{-1}	10.6	9.8	9.8	10.2	9.5	9.6	0.4	NS	*	NS
FCR	5.2d	4.9d	4.6c	4.9	5.4	5.0	0.2	NS	NS	0.17
DMD	65.7c	69.3d	68.9cd	69.5b	72.5b	63.2a	1.4	NS	**	**

[1]L and Q indicate linear and quadratic effects of enzyme level on barley+silage treatments.
ADG = average daily gain.
[c,d]Enzyme-treatment of barley+silage differs (P<0.10).
[a,b]Enzyme-treatment of barley+straw differs (P<0.05).
*, **, NS indicate P<0.10, P<0.05, and P>0.10, respectively.