Post-ruminal supplementation of exogenous polysaccharide-degrading enzymes. AN Hristov[1], TA McAllister[1], RJ Treacher[2], K-J Cheng[1] (*[1]Research Centre, Agriculture and Agri-Food Canada, P.O. Box 3000, Lethbridge, Alberta T1J 4B, Canada; [2]FinnFeeds International, Marlborough, UK)*

Exogenous polysaccharide-degrading enzymes (PDE) supplemented to ruminant diets are subjected to microbial fermentation in the rumen and proteolytic digestion in the abomasum before reaching the intestine. We have shown that under normal feeding conditions a portion of the supplemental enzymes escape ruminal and abomasal inactivation and increase the polysaccharidase activity of duodenal digesta [1]. In theory, increased levels of PDE in the intestine of ruminants could affect digestibility and nutrient absorption. To test this possibility, an incomplete Latin square experiment with four heifers (469±6.0kg) and three treatments was conducted. Control (C) - no enzyme addition; PDE-treated feed (EF) - 48.0g PDE head^{-1} day^{-1} (1:1 mixture of a cellulase and a xylanase, FinnFeeds International); and PDE infused into the abomasum (EA) at 41.6g head^{-1} day^{-1}. Heifers were fed a diet composed of 60% rolled barley, >35% corn silage and 5% soybean meal ad libitum. Rumen disappearance of DM (in sacco) of PDE-treated feed was not different from control. Viscosity of duodenal digesta tended (P>0.05) to be lower on both EF and EA compared to the control - 1.73, 1.56 and 1.54cP (C, EF and EA, respectively). The CMC-ase and xylanase activities of rumen fluid tended to be higher when the enzyme-treated diet was fed. Both treatments increased considerably the CMC-ase and xylanase activities of duodenal digesta. Total tract digestibility of DM was not affected by the treatments: 0.80, 0.81 and 0.82 for C, EF and EA, respectively, although it tended to increase linearly with increasing xylanase activity at the duodenum (r^2=0.98). The beneficial effects of exogenous enzymes on ruminant performance may be partially due to the ability of these additives to enhance polysaccharidase activity in the small intestine.

1. Hristov, AN, McAllister TA, Treacher RJ, Cheng K-J (1997) *Proc Western Section, Am Soc Anim Sci*, 48 (in press)

Enzymes in rumen and duodenal contents of heifers

Activity (nmol RS ml^{-1} min^{-1})[z]	*C*	*EF*	*EA*	*P*
Rumen				
Carboxymethyl-cellulase	42.66	51.86	41.10	0.174
Xylanase	215.23	298.11	208.13	0.239
Amylase	190.11	160.54	95.90	0.290
Duodenum				
Carboxymethyl-cellulase	0.00[a]	0.75[b]	2.20[b]	0.033
Xylanase	3.62[a]	45.11[a]	109.12[b]	0.000
Amylase	0.98	0.82	0.77	0.290

[z]RS-reducing sugars, [a,b]Means without a common superscript differ at P<0.05