

The Effect of Treating Forages with Fibrolytic Enzymes on its Nutritive Value and Lactation Performance of Dairy Cows

L. Kung Jr.¹, R. J. Treacher², G. A. Nauman¹,
A. M. Smagala¹, K. M. Endres¹, and M. A. Cohen¹

¹ Department of Animal & Food Science, College of Agriculture and Natural Resources, University of Delaware, Newark, 19717-1303

² Finnfedds International, Marlborough, Wiltshire SN8 1AA, UK

Forages (corn silage and alfalfa hay) were sprayed with liquid enzymes prior to combining with a concentrate to form a total mixed ration (50% forage:50% concentrate, dry matter basis) and fed to lactating cows. In the first year, treatments were 1) no enzymes, 2) an enzyme complex containing 3500 carboxymethyl cellulase (CMCase) and 16,000 xylanase units per kilogram of forage dry matter, or 3) an enzyme complex containing 8800 CMCase units and 40,000 xylanase units. In the second year, the treatments were 1) no enzymes, 2) an enzyme complex as in yr 1 containing 3700 CMCase and 14,000 xylanase units, or 3) an enzyme complex using an alternative cellulase and containing 3600 CMCase and 11,000 xylanase units. In the first year, cows fed diet 2 tended to produce more milk (39.5 kg/d) than those fed diet 1 (37.0 kg/d) or those fed diet 3 (36.2 kg/d). The high level of enzyme treatment in diet 3 decreased the output of milk protein and fat compared to the low level of enzyme treatment. In the second year, cows fed diet 3 produced more milk (35.4 kg/d) than did those fed diet 1 (32.9 kg/d) and numerically more than those fed diet 2 (33.6 kg/d). Milk fat and protein were similar among treatments but numerically lower for cows fed enzyme-treated forages. Dry matter intake (kg/d) was similar among treatments in both years. Spraying certain doses and combinations of enzymes directly onto forages prior to feeding can improve milk yields but enzyme sources and dose levels are of critical importance.

Key Words: enzymes • cellulase • xylanase • forage

Submitted on January 27, 1999

Accepted on August 17, 1999

This article has been cited by other articles:

This Article

- ▶ [Full Text \(PDF\)](#)
- ▶ [Alert me when this article is cited](#)
- ▶ [Alert me if a correction is posted](#)

Services

- ▶ [Similar articles in this journal](#)
- ▶ [Similar articles in PubMed](#)
- ▶ [Alert me to new issues of the journal](#)
- ▶ [Download to citation manager](#)
- ▶ [Get Permissions](#)

Citing Articles

- ▶ [Citing Articles via HighWire](#)
- ▶ [Citing Articles via Google Scholar](#)

Google Scholar

- ▶ [Articles by Kung, L.](#)
- ▶ [Articles by Cohen, M. A.](#)
- ▶ [Search for Related Content](#)

PubMed

- ▶ [PubMed Citation](#)
- ▶ [Articles by Kung, L., Jr.](#)
- ▶ [Articles by Cohen, M. A.](#)



Journal of Animal Science

▶ HOME

L. A. Giraldo, M. L. Tejido, M. J. Ranilla, S. Ramos, and M. D. Carro
Influence of direct-fed fibrolytic enzymes on diet digestibility and
ruminal activity in sheep fed a grass hay-based diet

J Anim Sci, July 1, 2008; 86(7): 1617 - 1623.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of Dairy Science

▶ HOME

K. F. Knowlton, M. S. Taylor, S. R. Hill, C. Cobb, and K. F. Wilson
Manure Nutrient Excretion by Lactating Cows Fed Exogenous
Phytase and Cellulase

J Dairy Sci, September 1, 2007; 90(9): 4356 - 4360.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of Dairy Science

▶ HOME

J.-S. Eun, K. A. Beauchemin, and H. Schulze
Use of Exogenous Fibrolytic Enzymes to Enhance In Vitro
Fermentation of Alfalfa Hay and Corn Silage

J Dairy Sci, March 1, 2007; 90(3): 1440 - 1451.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of Animal Science

▶ HOME

D. Colombatto, F. L. Mould, M. K. Bhat, D. P. Morgavi, K. A. Beauchemin,
and E. Owen

Influence of fibrolytic enzymes on the hydrolysis and fermentation
of pure cellulose and xylan by mixed ruminal microorganisms in
vitro

J Anim Sci, April 1, 2003; 81(4): 1040 - 1050.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of Dairy Science

▶ HOME

J. D. Sutton, R. H. Phipps, D. E. Beever, D. J. Humphries, G. F. Hartnell, J.
L. Vicini, and D. L. Hard

Effect of Method of Application of a Fibrolytic Enzyme Product on
Digestive Processes and Milk Production in Holstein-Friesian Cows

J Dairy Sci, February 1, 2003; 86(2): 546 - 556.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of Dairy Science

▶ HOME

J. L. Vicini, H. G. Bateman, M. K. Bhat, J. H. Clark, R. A. Erdman, R. H.
Phipps, M. E. Van Amburgh, G. F. Hartnell, R. L. Hintz, and D. L. Hard

Effect of Feeding Supplemental Fibrolytic Enzymes or Soluble Sugars
with Malic Acid on Milk Production

J Dairy Sci, February 1, 2003; 86(2): 576 - 585.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of Animal Science

▶ HOME

K. A. Beauchemin, D. Colombatto, D. P. Morgavi, and W. Z. Yang
Use of Exogenous Fibrolytic Enzymes to Improve Feed Utilization by
Ruminants

J Anim Sci, February 1, 2003; 81(14_suppl_2): E37 - 47.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of Dairy Science

[▶ HOME](#)

K. F. Knowlton, J. M. McKinney, and C. Cobb
Effect of a Direct-Fed Fibrolytic Enzyme Formulation on Nutrient Intake, Partitioning, and Excretion in Early and Late Lactation Holstein Cows

J Dairy Sci, December 1, 2002; 85(12): 3328 - 3335.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of Dairy Science

[▶ HOME](#)

G. R. Bowman, K. A. Beauchemin, and J. A. Shelford
The Proportion of the Diet to which Fibrolytic Enzymes are Added Affects Nutrient Digestion by Lactating Dairy Cows

J Dairy Sci, December 1, 2002; 85(12): 3420 - 3429.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of Dairy Science

[▶ HOME](#)

L. Kung Jr., M. A. Cohen, L. M. Rode, and R. J. Treacher
The Effect of Fibrolytic Enzymes Sprayed onto Forages and Fed in a Total Mixed Ratio to Lactating Dairy Cows

J Dairy Sci, September 1, 2002; 85(9): 2396 - 2402.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

[HOME](#) [HELP](#) [FEEDBACK](#) [SUBSCRIPTIONS](#) [ARCHIVE](#) [SEARCH](#) [TABLE OF CONTENTS](#)

[Copyright © 2000 by the American Dairy Science Association ®.](#)