

In Situ Ruminant Degradation of Fractional Corn Distillers Grains

W. Z. Yang¹, L. Armentano² and Y. L. Li¹

¹Lethbridge Research Center, Agriculture and Agri-Food Canada, Lethbridge, AB, T1J 4B1,

²University of Wisconsin, Madison, WI, 53706-1284

E-mail: yangw@agr.gc.ca

The grain-based ethanol industry is heading toward a fractionation process by physically separating dry shelled corn into a high fibre bran, germ and endosperm prior to mashing and fermentation of the endosperm. This process increases fermentation efficiency and market opportunities for by-products but may significantly change feed value of by-products. The objective was to determine in situ ruminal digestion of distillers grains (DG) with solubles (DGS) varying in process (traditional vs. fractional).

Eleven samples with 7 traditional, 1 fractional with solubles (endosperm DGS), 2 fractional without solubles (endosperm DG) and 1 mixture of unfermented bran and syrup were tested. Five grams of ground (2-mm) sample were incubated in situ in the rumen of lactating dairy cows for 0, 2, 4, 8, 13, 18, 24 and 48 hours. The model $y=a+b(1-e^{-kdt})$ was fitted to determine the kinetics of protein degradation, where a=soluble fraction; b=potential degradable fraction; kd=degradation rate constant at which b is degraded; and t= time of incubation. Effective degradability (ED) of protein was determined by $ED=a+[bkd/(kd+kp)]$, where $kp=0.06/h$. Protein content of the samples were 32, 52, 51 and 20% for traditional, endosperm DGS, endosperm DG and bran/syrup, respectively. In situ ruminal degradation rate and ED of protein varied substantially and ranged from 1.6 to 5.1 %/h and from 21.7 to 82.8%, respectively (Table 1).

Table 1. In situ ruminal degradation kinetics and ED of ethanol by-products

	Degradation kinetic parameters			
	a, %	b, %	kd, %/h	ED, %
Traditional DGS	11.8	73.7	2.91	32.7
Endosperm DGS	25.0	71.8	5.07	55.6
Endosperm DG	2.2	95.2	1.63	21.7
Bran/syrup	73.9	23.4	3.75	82.8

Implications: Information on the milling process prior to fermentation and the components of by-products must be considered to choose ethanol by-products for feeding dairy cows. The protein content and by-pass protein of the by-products can be very different.