

# Effect of a *Yucca Schidigera*-based surfactant on ruminal degradability of corn grain dry matter and starch

Hristov<sup>1</sup>, A. N., J. K. Ropp<sup>1</sup>, and D. Greer<sup>2</sup>

<sup>1</sup>Department of Animal and Veterinary Science, University of Idaho, Moscow, ID and <sup>2</sup>AgriChem, Inc., Ham Lake, MN

Processing of grain is an important variable determining diet responses in feedlot cattle. Tempering of grain is frequently practiced in the feedlot industry; the goal is to accelerate moisture uptake and reduce fine particles during rolling (Zinn et al., 1998). Moisture uptake can be further improved by addition of surface-active agents during tempering, which can also have biological effects in the rumen (Hristov et al., 1999).

The objective of this experiment was to investigate the effect of a *Yucca schidigera* extract-based surfactant, Grain Prep<sup>®</sup> surfactant (GP), on corn grain dry matter and starch degradability in the rumen *in sacco*.

## Materials and Methods

The effect of GP (containing 8.4% *Yucca Schidigera* saponins) on ruminal *in sacco* degradation parameters of flaked corn DM and starch was tested in a commercial feed mill setting. Over a two-day period, a total of 59 separate samples were collected. GP was applied at 22 g/ton grain; Control was water (average water addition during the flaking process was 3%). Three lactating Holstein cows fitted with ruminal cannulae, fed a 40% energy concentrate/17% protein concentrate/40% forage diet were used in the *in sacco* experiment. Flaked, intact corn kernels (34 lb./bu.) were incubated in the

**Table 1. Ruminal *in sacco* degradability of flaked corn grain DM and starch as affected by Grain Prep surfactant (least squares means and associated SE)**

Item	Control	GP	P
<b>DM</b>			
Soluble/instantly degradable DM, %	39.6±1.11	45.8±1.09	***
Potentially degradable (PD) DM, %	57.6±1.82	52.1±1.88	*
Rate of degradation of PD, %/h	4.8±0.45	4.5±0.47	NS
Effective degradability, %	65.1±0.64	68.2±0.63	***
<b>Starch</b>			
Soluble/instantly degradable starch, %	38.6±1.36	45.7±1.31	***
Potentially degradable (PD) starch, %	61.3±1.96	55.4±2.06	*
Rate of degradation of PD, %/h	5.6±0.56	5.0±0.55	NS
Effective degradability, %	68.2±0.76	70.9±0.75	*

<sup>1</sup> Treatment: Control – water; GP – 22 ppm Grain Prep surfactant

<sup>2</sup> Effective degradability was calculated with 6%/h ruminal passage rate  
NS, non-significant ( $P > 0.05$ ); \*,  $P < 0.05$ ; \*\*\*,  $P < 0.001$

rumen for a period of 0, 2, 4, 6, 16, 24, 48, and 72 h. Bags were replicated within animal.

Degradability parameters were estimated using dummy variable technique for treatment comparisons (PROC NLMIXED). Passage rate of 6%/h was used to calculate effective degradability. All analyses were performed using SAS (SAS Inst. Inc., Cary, NC).

## Results

Average DM and starch content of the corn grain were not different ( $P > 0.05$ ) between treatments (mean±SE): 80.0±0.17 and 73.1±1.07%.

Fig. 1 Ruminal *in sacco* degradability of flaked corn DM (means ± SE)

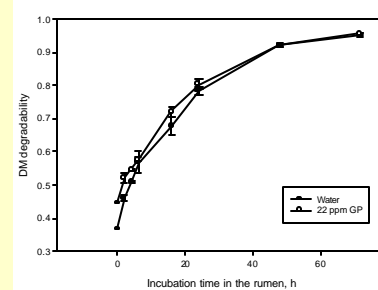
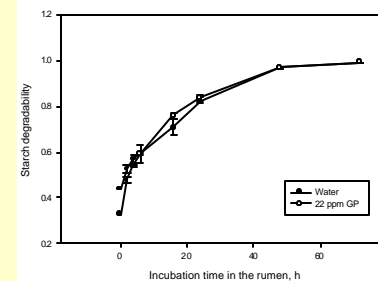


Fig. 2 Ruminal *in sacco* degradability of flaked corn starch (means ± SE)



Compared to the water-treated control, GP increased the soluble/instantly degradable DM and starch of flaked corn grain (by 16%;  $P < 0.001$  and by 18%;  $P < 0.001$ , respectively; Table 1). The potentially degradable DM and starch were reduced ( $P < 0.05$ ) in GP-treated corn compared to the control. Rate of DM or starch degradation in the rumen were not affected ( $P > 0.05$ ) by treatment.

Effective degradability of corn grain DM and starch were increased (by 5 and 4%,  $P < 0.001$  and  $P < 0.05$ , respectively) by GP compared to the control. The differences in ruminal DM and starch disappearance were greater within the first 24 h of the *in sacco* incubation (Fig. 1 and 2) and diminished thereafter. The marked effect of GP on corn grain DM and starch solubility in the rumen was likely a result of the surface-active properties of GP rather than its antimicrobial capacity.

## Conclusion

Grain Prep surfactant-treated corn had higher *in sacco* degradability of DM and starch in the rumen of lactating dairy cows. The difference was mostly due to an increase in the soluble/instantly degradable DM or starch with the treated corn.

Hristov, A. N., McAllister, T. A., Van Herk, F. H., Cheng, K.-J., Newbold, C. J., Cheeke, P. R., 1999. *J. Anim. Sci.* 77, 2554-2563.

Zinn, R. A., E. G. Alvarez, M. F. Montano, A. Plascencia, and J. E. Ramirez. 1998. *J. Anim. Sci.* 76:2239-2246.