

# **Feeding Distiller's Dried Grains to Lactating Dairy Cows in the Pasture-Region of Chile: Field Trial Results**

**Professor Randy Shaver**  
Department of Dairy Science  
College of Agricultural & Life Sciences  
University of Wisconsin - Madison  
University of Wisconsin - Extension  
<http://www.uwex.edu/ces/dairynutrition/>

**Ricardo Ehrenfeld and Mario Olivares**  
Cooprinsem  
Osorno, Chile

**Jaime Cuellar**  
US Grains Council  
Bogota, Columbia

## **Introduction**

The supply of distiller's dried grains (DDGS) available for livestock feeding has increased with the growth in USA production of ethanol from cereal grains in recent years. There are numerous research and extension publications regarding the feeding of DDGS to lactating dairy cows, and DDGS has become a popular ingredient in dairy cattle diets when priced competitively relative to other available feed ingredients. Relatively little information can be found, however, with regard to the feeding of DDGS to dairy cows being fed primarily pasture for forage. The southern dairy region of Chile, where approximately 70 percent of Chile's milk is produced, is largely a pasture-based dairy production system. We

conducted a field trial on six pasture-based dairy farms near Osorno, Chile in 2008. The objective of our field trial was to determine the effect of feeding USA-supplied corn DDGS on milk yield, composition and component yields and economics in the pasture-region of Chile. The purpose of this paper is to describe our field trial and report the results.

### **Methods and Results**

The feeding trial was replicated on each of the six dairy farms during Winter (July and August) and Spring (November and December) experimental periods to coincide with the practice of feeding forage comprised of primarily silage during the winter and pasture during the spring. Only cows that completed the two-month experimental period in Winter or Spring were included in the dataset for analysis. The number and composition of experimental cows on each farm is presented in Table 1.

Only for Farm F could the treatments be applied concurrently. This was done by feeding different concentrate mixes through the milking parlor feeders; one without DDGS (**CONT**) and one containing 40% DDGS (**DIST**). The average feeding rate of concentrates in the parlor was 5 kg per cow per day; the average feeding rate of DDGS from the DIST concentrate was 2 kg per cow per day (as fed basis). The DDGS in the DIST concentrate partially replaced, on an equivalent crude

protein (**CP**) basis, dry rolled shelled corn (**DRSC**) - soybean meal (**SBM**) and dry rolled wheat (**DRW**) - SBM contained in the *CONT* concentrate during the Winter and Spring experimental periods, respectively. Cows available during the Winter and Spring experimental periods were blocked by parity (1<sup>st</sup> and 2<sup>nd</sup> or greater lactations), randomly assigned to treatments (*CONT* or *DIST*), and fed the treatments individually for two months continuously. Milk yield for individual cows was recorded daily electronically in the milking parlor. Milk samples from individual cows were collected at both the morning and evening milkings on one day every two weeks during the experimental periods by Cooprinsem DHI for milk composition analysis. Data were analyzed statistically as a randomized complete block design with cows as the experimental unit. Results are presented in Table 2.

Milk yield tended to be greater for cows fed *DIST* by 1.9 kg/d in Winter and 1.8 kg/d in Spring. Milk composition was unaffected by treatment in the Winter, however, milk fat yield tended to be greater and milk protein yield was greater for cows fed *DIST* by 75 g/d and 73 g/d, respectively. Milk fat content was lower for cows fed *DIST* by 0.26%-units in the Spring, however, milk fat yield was unaffected by treatment. Other milk composition measurements (protein, urea and *SCC*) were unaffected by treatment in the Spring. Milk protein yield tended to be greater for cows fed *DIST* by 50 g/d in the Spring.

The other five farms could not apply the treatments concurrently. Farms A, B, C and E were randomly assigned to either CON to DIST or DIST to CON treatment sequence in a Crossover design with monthly feeding periods during the Winter and Spring experimental periods. Farm D was assigned to a CONT to DIST to CONT feeding sequence with two 15-day feeding periods for CONT and a one month feeding period for DIST during the Winter and Spring experimental periods. The CONT or DIST concentrates were fed to the whole herd on each of the five farms in the bunk mixed with silage prior to milking according to their respective treatment sequence during the Winter and Spring experimental periods. The average feeding rate of DDGS from the DIST concentrate was 2.5 kg per cow per day (as fed basis). The DDGS in the DIST concentrate partially replaced, on an equivalent CP basis, DRSC and DRW - SBM (Farm A), high-moisture corn (HMC) - canola meal (CNM; Farm B), DRSC - peanut meal (Farm C), HMC - CNM - salmon meal (Farm D), and DRSC - SBM (Farm E) contained in the CONT concentrates during the Winter experimental period. During the Spring experimental period, the DDGS in the DIST concentrate partially replaced, on an equivalent CP basis, DRW - SBM (Farms A and E), HMC - CNM (farms B and D), DRSC - Wheat Midds (Farm C). Milk yield for individual cows was recorded daily electronically in the milking parlor (3 farms) or on one day every two weeks by Cooprinsem DHI (2 farms) during the

experimental periods. Milk samples from individual cows were collected at both the morning and evening milkings on one day every two weeks during the experimental periods by Cooprinsem DHI for milk composition analysis. Individual cow level data were used to calculate experimental herd level data for each 2-week period for statistical analysis. Data were analyzed statistically using a mixed models procedure with period, sequence and treatment as fixed effects and farm within sequence as a random effect. Results are presented in Table 3.

Milk yield was greater for farms fed DIST by 0.9 kg/d in Winter. Milk fat and protein content tended to be lower for farms fed DIST in Winter, however, fat and protein contents for these farms when fed DIST were still 3.93% and 3.38%, respectively, and yields of fat and protein were unaffected by treatment. Milk urea and SCC were unaffected by treatment in Winter. The feeding of DIST during the Spring did not affect milk yield, composition or component yields on these five farms.

### **Discussion and Conclusions**

When increased, milk yield was 3.3% to 6.5% greater for DDGS. The quality of the DDGS fed was good and consistent throughout the study (n = 10; CP = 30.7 ± 1.4%; NDF = 29.0 ± 1.7%; Ether Extract = 12.0 ± 0.5%).

The lack of milk yield response to DDGS in the Spring experimental period for the 5-farm combined analysis may have been related to higher quality forage from pastures in the Spring more closely meeting nutrient requirements for milk production. The nutrient composition of the ryegrass pastures during the Spring when they were the primary source of forage was (n = 44; CP = 22.9 ± 5.0%; NDF = 43.7 ± 5.0%; ADF = 27.1 ± 2.8%; TDN = 66.8 ± 4.1%), while the nutrient composition of the ryegrass silages during the Winter when they were the primary source of forage was (n = 20; CP = 15.5 ± 3.5%; NDF = 46.8 ± 5.8%; ADF = 30.0 ± 3.0%; TDN = 62.6 ± 4.8%).

The consistent lack of treatment effects on milk urea and SCC indicates that feeding DDGS was not adverse to these cow health related measurements in this relatively short-term study. The reduction in milk fat content observed in the Spring for cows fed DDGS for one of the farms may have been related to a high intake of unsaturated fatty acids from DDGS and Spring pastures in combination. Reducing the feeding rate of DDGS in the Spring may have alleviated the depression in milk fat content observed on that farm.

A supplemental feed cost analysis was performed using actual feed supplement prices for each farm during July - December, 2008. Marginal daily supplemental feed costs were reduced for all six farms in the Winter by 21% on

average, and for 4 of the 6 farms in the Spring by 14% on average. Marginal daily milk income was calculated for each herd using local milk prices for July - December, 2008 and the milk yield responses to DDGS observed in our study. The increase in marginal daily milk income in the Winter was 3.6% on average ranging from 2.5% to 6.5% across the six farms. Averaged across the six farms the marginal utility, which combines marginal feed cost and marginal income changes, was greater for DDGS by \$0.50 US per cow per day in the Winter and by \$0.14 US per cow per day in the Spring (assumed December, 2008 exchange rate of 650 Chilean pesos per US dollar). We conclude that DDGS was an effective supplement in dairy concentrates fed in the pasture region of Chile under the conditions of this study, and that the use of DDGS can be economical when priced competitively relative to other available feed ingredients.

Table 1. The n, % 1<sup>st</sup> lactation cows, and days in milk (DIM) for cows that completed the two-month winter and spring experimental feeding periods on each farm.

<b><u>Farm</u></b>	<b><u>n</u></b>	<b><u>% 1<sup>st</sup> Lactation Cows</u></b>	<b><u>DIM at Trial Initiation</u></b>
<b><u>Winter</u></b>			
A	231	33	148
B	199	31	121
C	100	33	128
D	139	0	235
E	201	26	173
F	130	30	129
<b><u>Spring</u></b>			
A	256	28	160
B	137	24	89
C	82	0	105
D	255	0	173
E	169	24	146
F	170	28	159

Table 2. Treatment effects on lactation performance for Farm F where data were analyzed statistically as a randomized complete block design with cows as the experimental unit. Data presented are least squares means from the mixed model.

<u>Item</u>	<u>CONT</u>	<u>DIST</u>	<u>Statistical Significance</u>
<b><u>Winter</u></b>			----- (P <) -----
Milk Yield, kg/d	29.1	31.0	0.07
Fat, %	4.17	4.09	NS
Fat, g/d	1212	1287	0.11
Protein, %	3.42	3.38	NS
Protein, g/d	989	1062	0.02
Urea, mg/L	612	619	NS
SCC, x1000	132	157	NS
<b><u>Spring</u></b>			----- (P <) -----
Milk Yield, kg/d	32.9	34.7	0.07
Fat, %	3.68	3.42	0.01
Fat, g/d	1193	1180	NS
Protein, %	3.51	3.45	NS
Protein, g/d	1146	1196	0.09
Urea, mg/L	354	357	NS
SCC, x1000	95	97	NS

Table 3. Treatment effects on lactation performance for Farms A - E where data were analyzed statistically using a mixed models procedure with period, sequence and treatment as fixed effects and farm within sequence as a random effect. Data presented are least squares means from the mixed model.

<u>Item</u>	<u>CONT</u>	<u>DIST</u>	<u>Statistical Significance</u>
<b><u>Winter</u></b>			----- (P <) -----
Milk Yield, kg/d	27.7	28.6	0.03
Fat, %	4.09	3.93	0.10
Fat, g/d	1136	1123	NS
Protein, %	3.44	3.38	0.08
Protein, g/d	957	967	NS
Urea, mg/L	238	234	NS
SCC, x1000	351	360	NS
<b><u>Spring</u></b>			----- (P <) -----
Milk Yield, kg/d	32.9	32.9	NS
Fat, %	3.62	3.56	NS
Fat, g/d	1187	1167	NS
Protein, %	3.36	3.34	NS
Protein, g/d	1107	1097	NS
Urea, mg/L	350	347	NS
SCC, x1000	232	235	NS