

Corn Ethanol By products



Grain Milling/Processing Operations

- Generally want to remove the starch portion of the grain
- Residue remaining (byproducts) are generally contain high levels of digestible fiber and protein
- Dry milling process used for ethanol wet milling for corn sweetner





Corn Composition



Dry Corn Milling





Corn Milling Procedures

• Dry milling

- Corn is hammer milled without prior soaking in water
- End products
 - Food grade: Corn grits, hominy, alcohol
 - Industrial grade: Ethanol, alcohol



U.S. Ethanol Biorefinery Locations



North Dakota Ethanol Development



NDSU Animal and Range Sciences

Operating

Planned

Contact Information for DDGS

- Alchem, Ltd Grafton 1-888-488-2778
- ADM Walhalla 1-888-541-1062
- Blue Flint Ethanol Underwood
 1-701-442-7505
- Red Trail Energy Richardton plant 1-701-974-3308
 Commodity Specialists 1-800-769-1066

Ethanol Production Capacity in the United States



CORN NET EXPORTS (+) AND NET IMPORTS (-), 15-16



Corn Acreage and Production in ND



One Bushel of Corn Produces:

•2.7 Gallons of ethanol •18 Pounds of DDG •Or 54 Pounds of WDG •18 Pounds of carbon dioxide

Dry Distillers Grain For Sale \$70.00 F.O.B. The Plant - Good Availability Wet Distillers Grain For Sale \$17.00 F.O.B. The Plant - 33% Dry Matter North Country Ethanol Rosholt, SD

Tom Lane, Commodity Manager Corn/Distillers Grains 605-537-4585

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Ethano

Corn Condensed Distillers Solubles

- Also referred to as 'corn syrup'
 - Feed industry = CCDS
- Highly variable nutritional content
 - DM
 - CP
 - Fat
 - Energy
 - Minerals
- Sometimes being given away if freight is paid



Corn Condensed Distillers Solubles

- Contains (DM basis):
 - 20 to 30% CP
 - 20% UIP (highly degradable)
 - 80 to 93 NEg (Mcals/100 lbs)
 - 9 to 15% fat
 - 1.30 to 1.45% P
 - 1.75 to 2.25% K
 - 0.37 to 0.95% S

Nutrient Content of CCDS

	Product A	Product B	
Fat, % DM	4.2	17.4	
CP, % DM	15.4	21.6	

Plant to plant variation
Day to day variation within plant

Gilbery et al., 2006

Corn Condensed Distillers Solubles

- Liquid byproduct
- Need liquid handling capability
- Can freeze
- Best results when tanks are buried
- Excellent ration conditioner
 - Controls dust
 - Improves palatability

Effect of High Fat CCDS on Feed Intake in Forage Based Diets



Lin, P = 0.01

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Gilbery et al., 2006

Buried Tank System







Dried Distillers Grains Plus Solubles

- Contain:
 - 25 to 32% CP
 - 47 to 57% UIP
 - 68 to 70 NEg (Mcals/100 lbs)
 - 8 to 10% fat
 - 0.4 to 0.8% P
 - 0.87 to 1.33 K
 - 0.37 to 0.46 S

Dried Distillers Grains with Solubles



Dried Distillers Grains Plus Solubles

- Feed at 10 to 15% of the diet as a source of supplemental protein
- Feed at higher levels as an energy source
 - Economics determine appropriate level
- Maximum recommended level = 40% of the diet
 - N and P will be above requirements and could cause nutrient management problems
 - Sulfur issues

Dried Distillers Grains Plus Solubles

- Can be used as a protein supplement for forage fed cattle
- Majority of the protein is escape or bypass protein
 - Rely on urea recycling to use the escape protein in DDGS
- Stalker et al. (2004)
 - No differences in animal performance with urea inclusion in supplements based on DDG

Handling DDGS

- Doesn't pellet well
- If you want to try pelleting
 - Add wheat midds, soybean hulls or other byproducts
 - 40% or more of the pellet?
- Storage
 - Will bridge and cause problems with conventional storage
 - Flat storage works best

Feeding Dried Distillers Grains on the Ground

- Concern
 - Feed waste
- Fat content may prevent some blowing when fed in meal form
- Feeding on used conveyor belts may be an option

Wet Distillers Grains

- Contain 25-35% DM (65-75% moisture)
- Contain 30 to 35% CP on a DM basis
- Contain 70 to 80 Mcal NEg/cwt
 - 100 to 115% value of corn
- 8 to 12% fat
- 0.5 to 0.8% P

Transportation and Storage

- Haul in end dump or live bottom trucks
- Will store 7-10 days in summer before mold, in winter freezing an issue
- Plants now selling modified wet at 50% DM which is more economical to truck
- Some success in bagging or packed pile in blends with stover, straw or hay to stockpiling for latter use

Ration Mixing

- Ration mixing is important in forage based diets
- Separation of DDGS from forages increases likelihood of sulfur related problems

Commodity Bay Storage



High corn prices create challenges for cowmen



Example Rations with DDGS

	600 lb steer 2.5 ADG	1300 lb cow 7 mon pg.5 ADG
Grass Hay (45)	8	
CRP Hay (35)		25
Oat Straw (25)		5
Corn (120)	3	
DDGS (90)	5	3
Salt/Min (500)	.35	.2
Cost/hd/day	\$.68	\$.68

Example Rations with Midds

	600 lb steer 2.5 ADG	1300 lb cow 7 mon pg.5 ADG
Grass Hay (45)	9.5	15
CRP Hay (35)		
Oat Straw (25)		11
Midds (80)	9.5	5
DDGS (90)		
Salt/Min (500)	.35	.2
Cost/hd/day	\$.65	\$.72

Example Rations with Canola Meal

	600 lb steer 2.5 ADG	1300 lb cow 7 mon pg.5 ADG
Grass Hay (45)	6	22
Corn Silage (25)	16	
Oat Straw (25)		10
Corn (120)	4	
Canola M (125)	2	2
Salt/Min (500)	.35	.2
Cost/hd/day	\$.76	\$.79

Future Opportunities ????



	%DM	%CP	%TDN	\$/T	\$/CP	\$/TDN	\$/BU	
Canola Meal	0.9	0.41	0.69	\$116.0	0.1571			
Corn	0.88	0.1	0.9	\$125.0		0.0789	\$3.50	
Barley	0.88	0.135	0.84	\$126.3			\$3.03	86.%
Oats	0.91	0.13	0.75	\$116.3			\$1.86	53.%
Barley Malt	0.89	0.14	0.74	\$115.1				
DDGS	0.9	0.28	0.86	\$173.0				
Wet DG	0.3	0.28	1.15	\$72.63				
Peas	0.88	0.23	0.88	\$158.1			\$4.75	135.%
Screenings	0.86	0.14	0.7	\$105.8				
Wheat Midds	0.88	0.14	0.78	\$119.4				
Soy Hull	0.92	0.12	0.8	\$121.9				
Hay	0.86	0.09	0.54	\$63.53			with 10% v	vaste

	%DM	%CP	%TDN	\$ / T	\$/CP	\$/TDN	\$/BU	
Canola Meal	0.9	0.41	0.69	\$0.00	0.0000			
Corn	0.88	0.1	0.9	\$125.00		0.0789	\$3.50	
Barley	0.88	0.135	0.84	\$116.67			\$2.80	80%
Oats	0.91	0.13	0.75	\$107.72			\$1.72	49%
Barley Malt	0.89	0.14	0.74	\$103.95				
DDGS	0.9	0.28	0.84	\$119.32				
Wet DG	0.3	0.28	1.15	\$54.66				
Peas	0.88	0.23	0.88	\$122.22			\$3.67	105%
Screenings	0.86	0.14	0.7	\$95.01				
Wheat Midds	0.88	0.14	0.78	\$108.33				
Soy Hull	0.92	0.12	0.8	\$116.16				
Нау	0.86	0.09	0.54	\$65.97			with 10% \	waste

Harvested Stover



- Often too moist for storage
- Wait till field cured or late with cool temps
- Some headers don't windrow much quantity
- May be difficult for some balers to bale
- Quality is less than when selectively grazed
- Porous bales do not keep well

Grazing Corn Residue

- Fence, water, shelter
- Grain>husk & leaf> stalk
- TDN 70 40 %
- CP 8-4%
- Salt + Phos + Ca +Vit A + ? CP
- 20 to 60 days grazing per acre
- Mud & snow reduce access and create waste
- Once grain is gone, limit to mid gestation mature cows + CP
- Compaction concerns??



Summary

- Ethanol coproduct availability will continue to increase
- Ethanol coproducts are good sources of nutrients for beef cattle
- Pay attention to nutrient analysis and variability
- Transportation economics are important

DDGS Sources

- AlChem, Ltd Grafton 888-488-2778
- ADM Walhalla 888-541-1062
- Blue Flint Underwood 442-7505
- Red Trail Richardton 974-3308
 - Commodity Specialists 800-769-1066
- Heartland Aberdeen 800-774-6537
 North Country Rosholt 605-537-4585
- James Valley Groton 605-397-2726

For More Information:

http://www.ext.nodak.edu/extpubs/beef.htm

Questions?





Philosophy

'Life is a series of choices,

Be sure you read the road signs...

....Or Be Ready to Deal With Problems!!!'

