Distillers Dried Grains and Their Impact on Corn, Soymeal, and Livestock Markets

Steve Markham

Senior Merchandiser, Commodity Specialists Company

Introduction

In 2004 the Ethanol industry produced 3.41 billion gallons, more than twice as much as in 2000.There are 88 ethanol plants in production or under construction. Approximately 75% of this production and the majority of the industry's growth over the last 5 years come from dry grind corn facilities. The bulk of the remaining production comes from the corn wet milling industry. Because a dry grind plant is cheaper to build and generally more efficient to operate with respect to ethanol production it seems logical that future growth will come in the form of dry grind corn plants. And come it will, currently 14 new dry grind facilities are in various stages of development in Iowa alone. If all 14 plants are built in the next 18 months like is being planed, Iowa, already the top ethanol producing state at 1262.5 billion gallons, will increase capacity by about 70%. Fortunately it appears we lack the ability to build that much capacity in 18 months.

Approximately 40% of dry grind coproduct, refereed to as wet distiller's grains with solubles are sold in various moisture contents ranging from 70% to 45%. Wet distiller's grain with solubles is marketed to rumens relatively close to production. It has a short shelf life directly affected by ambient temperature, and requires increased handling costs. Current dryer technology suggests efficiencies of 1,200 BTUs to dry a pound of water. Distillers dryers, generally natural gas fired are the single largest consumer of energy and the largest source of pollution in a dry grind corn plant.

Approximately 60% of dry grind production is marketed as distillers dried grains with solubles (DDGS) at 10% moisture. DDGS has a very long shelf life, and is easily transported all over the world. In the past DDGS traditionally has been consumed by rumens that are able to capitalize nutritionally on DDS's high bypass protein. Rapidly increasing freight costs in the domestic and export markets have forced DDGS into monogastric rations in the Corn Belt where ethanol is produced.

Supply. See Figure 1.

For the sake of comparison all of the numbers in my presentation are based on 100% of the production sold as DDGS. Trying to compare supply and demand with variable moisture content would be confusing. Current North American Production is around 7.5 mmt. Canada is included in this number as DDGS flows into Canada in the Western provinces and into the U.S. from the Eastern Provinces. Ten mmt of North America production is expected within 2 to 3 years.

DDGS has been predominantly a corn replacer. See Figure 2.

Every bushel ground in a dry grind plant produces about 17 pounds of DDGS. One can see the technology advancements with regard to efficiency per bushel the industry has made over the last 17 years. Even with increasing efficiencies we must grind 3 bushels of corn to produce one bushel of DDGS.

DDGS exports. See Figures 3 and 4.

DDGS exports continue to grow although not nearly as fast as the accelerated supply growth. Although decreasing in consumption due to cheaper competitive ingredients, the E. C. continues to be our largest customer. Significant growth is expected and being realized in Mexico, Central America, South America, and Asia. Rail Cars and trucks cross the Mexican and Canadian borders. Bulk Vessels loaded in New Orleans and Duluth make

their way to Europe, Mexico, central and South America, and even Cuba. Containers loaded anywhere in the Corn Belt they are found empty and on the West Coast are stuffed with DDGS to be returned to their Asian origins at very competitive rates. The U.S. Grains Council continues to assist our industry with developing export markets.

Current production and growth located in the Corn Belt. See Figure 5.

Significant monogastric consumption is found in the Corn Belt with significant Dairy consumption outside of the Corn Belt. Nutritionally dairy farmers can pay roughly 1/3 more for DDGS than hog producers can. However, CSC's average freight to hogs and poultry is less than $6.00 per short ton, while our average cost all the way to the dairy is over $50.00 per short ton.

Improving technology continues to improve handling characteristics and digestibility of DDGS. See Figure 6.

New golden DDGS is far superior in handling characteristics and digestibility, especially for monogastrics. The dry grind corn plant essentially converts the starch found in corn to sugar, which is then fermented to alcohol. Older technologies left significant unfermented starch and sugars in the feed creating a dark, burnt smelling, sticky feed, with a low digestibility of the amino acids. Sugars dried with conventional gas dryers caramelize causing the maillard reaction, a degrading in the digestibility of protein especially for monogastrics. Newer technology has been able to convert more of the starch and sugar to ethanol allowing plants to get more alcohol per bushel and significantly improving the quality of the DDGS.

27% freight increases in one year. See Figure 7.

DDGS has a bulk density on average of 32 pounds per cubic foot. As a result most shippers lease a specialized high cube car that is only available from one manufacturer with a 16-month lead-time. Railroads have raised rates by eliminating mileage payments on private cars. Railroad owned cars are not available for the transportation of DDGS. Fuel surcharges although coming down have gone from 2.5% to 8% in one year. Five year full service lease rates on new 6351cu ft capacity cars has gone from $450.00 to $630.00 per month due to increased steel costs and increased demand from our growing industry and others. The significantly overburdened rail system has slowed to a crawl more than doubling the time it takes for these expensive cars to make a round trip and further adding to the demand for cars. One viable solution has been 75 and 100 car units that drive efficiency at railroads effectively decreasing rates and improving velocity.

Export demand will continue to be hindered as long as freight stays relatively high. See Figure 8.

Demand for vessel freight especially from China, retirement of older small vessels for scrap, and no new bulk Vessels being built for the past few years with non planned has created a real freight shortage. High steel costs and big demand for containerships and tankers will slow the correction of this problem.

With all the recent nutrition research on newer process DDGS the amount of DDGS going to monogastrics continues to climb. See Figure 9.

These pie charts represent our estimates on species consumption by calendar year. Keep in mind the rapidly growing supply during this time frame. Dairy consumption remained fairly consistent from 2001 to 2002 while supplies grew. Increased beef consumption for wet distillers grains was spurred on by increasing natural gas costs and tighter pollution regulations on dryer emissions. The crop year 2003/2004 showed a slowing in monogastric consumption a direct result of higher protein costs, tight canola meal supply, and a small cotton crop with almost no imported cotton seed.

At 100% penetration in rumen diets corn belt states have significant in state consumption available. See Figures 10 and 11.

100 percent penetration in any market is nearly impossible, especially with available homegrown feeds and locally produced competitive ingredients, like corn gluten feed, brewers grains, wheat midds, malt sprouts, bakery byproduct, and linseed meal.

Once considered a corn replacement it is easy to see that DDGS trends very closely with Soybean Meal. See Figures 12 and 13.

In the last year synthetic lysine prices have fallen more than 50%, thanks to significant imports from China. The lysine deficiency of corn is multiplied by a factor of 3 in DDGS. Monogastic diets can now be cheaply fortified with synthetic lysine. As long as synthetic lysine is readily available DDGS will compete with the other oilseed proteins in all animal diets.

As more DDGS finds its way into monogastric diets it replaces increasing amounts of oilseed proteins. See Figures 14 and 15.

Inclusion of DDGS in ruminant rations has negligible effect on oilseed protein consumption. Inclusion of DDGS in monogastric rations significantly affects oilseed consumption. Notice the need to supplement monogastrics with synthetic lysine. Another important factor is the reduced need for Dicalcium Phosphate in mongastric diets, significantly reducing ration costs. Research at the University of Minnesota suggests Phosphorus, a nutritional requirement for all animals, found in corn is not available to monogastrics and is excreted in the manure. Phosphorus found in DDGS is Three times the level of corn and nutritionally available to monogastrics. Further research at the University of Minnesota also suggests that feeding DDGS to monogastrics can reduce Phosphorus emissions as it reduces the amount of corn used in the diet. Iowa, the number one Hog Sate in the nation has adopted a phosphorus manure management program. Many other states and provinces in Canada have enacted legislation to follow. In areas of high phosphorus soil concentration the feeding of some DDGS to replace corn will be the only option to meet new phosphorus manure regulations other than eliminating or reducing herd size. More groundbreaking research from Minnesota demonstrates the nutraceutical effect DDGS has on hogs. Gut health is the single biggest concern facing hog growers today. With growing consumer concern about medications and antibiotics in the food chain many pig feeders are using DDGS in their rations to improve gut health without the use of medications or antibiotics.

The best website on DDGS. See Figure 16.

This University of Minnesota web site, translated into several languages, contains all of the recent nutritional research on wet and dried distiller's grains done at Minnesota and many other universities. It also contains complete nutrient profiles on each plant CSC markets for, with pictures of the feed; Many feed nutritionists domestic and abroad rely on this web site for accurate dependable nutritional specifications on DDGS produced at specific locations. The website also includes many supply and demand presentations.

Conclusion

Rapid supply growth, improved quality, slow export growth, increased freight costs, sound nutritional research, and dependable nutritional information will force more distillers' products into all rations. Gut health concerns, Phosphorus manure regulations, and close geographic proximity to supply has and will continue to increase consumption of DDGS in monogastric rations at the expense of oilseed protein.

Figure 1

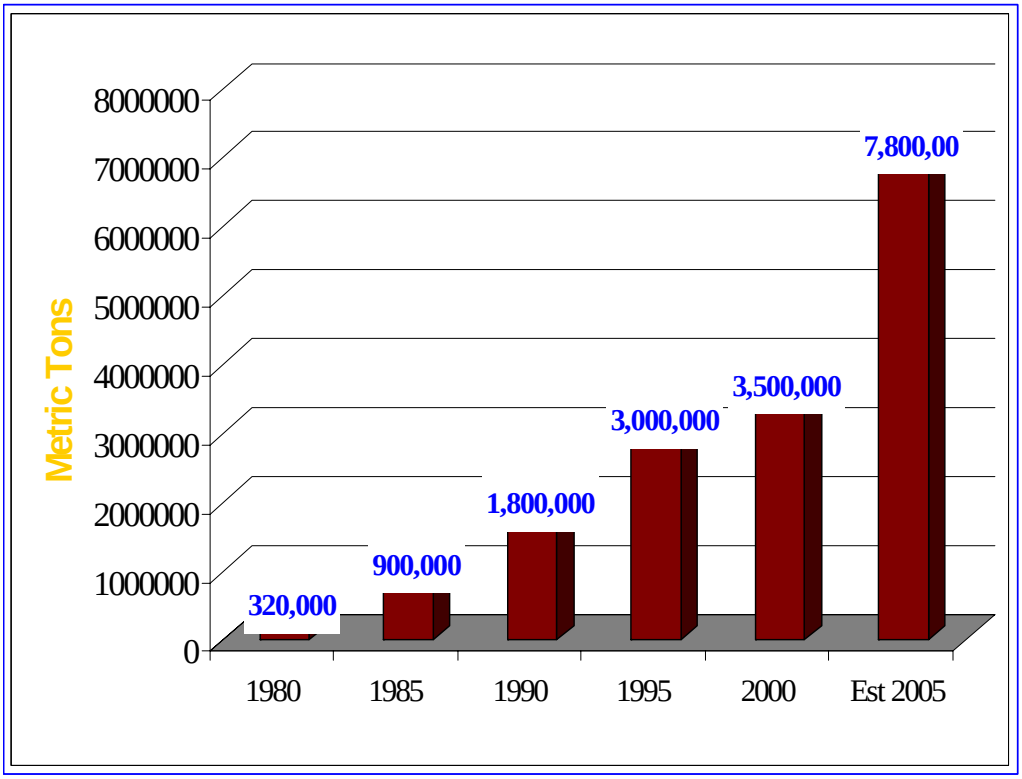

North American DDGS Production
Metric Tons
8000000
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
320,000
900,000
1,800,000
3,000,000
3,500,000
7,800,00
1980
1985
1990
1995
2000
Est 2005

Figure 2

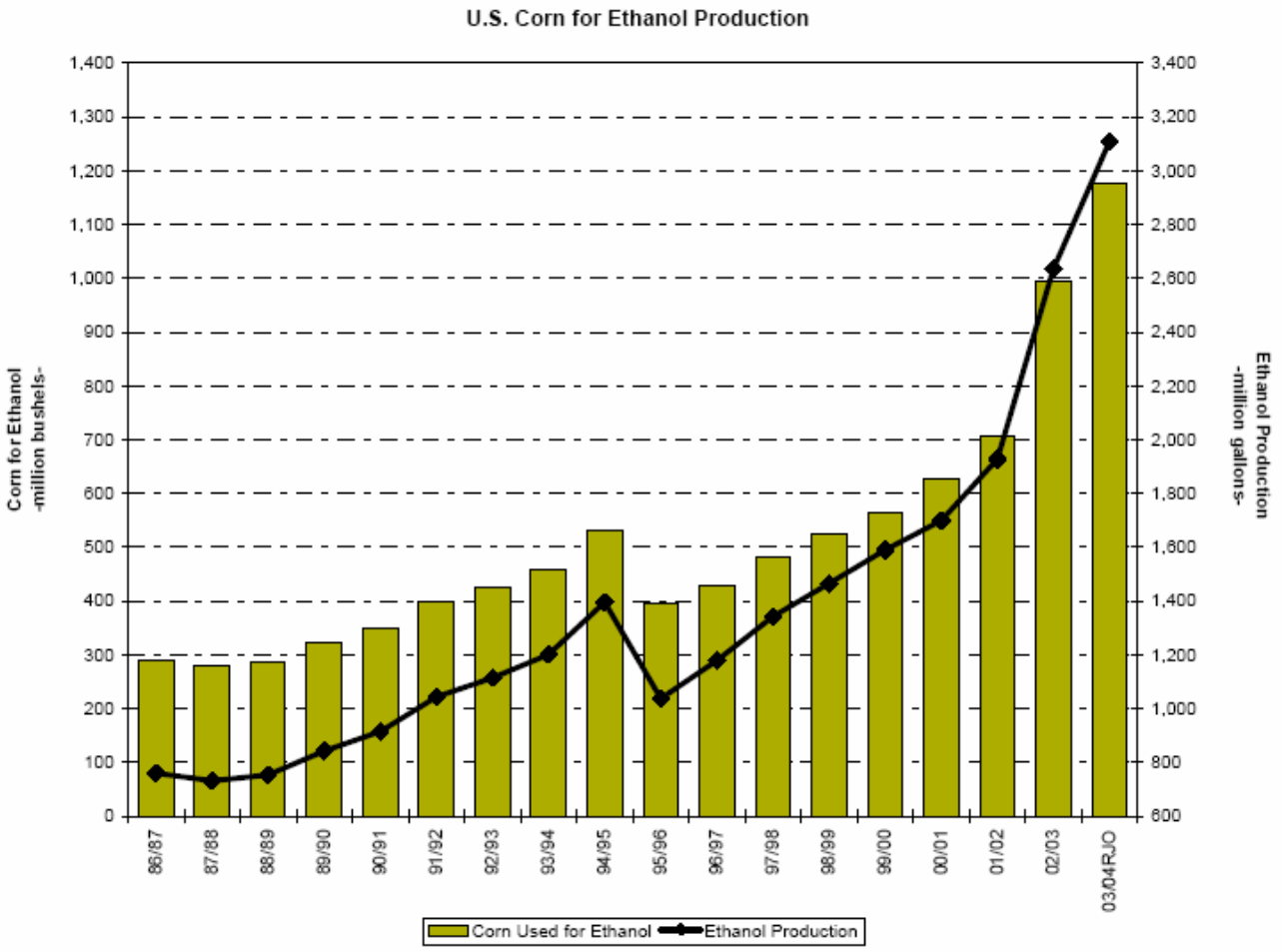

U.S. Corn for Ethanol Production
Corn for Ethanol
-million bushels-
Ethanol Production
-million gallons-
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
3,400
3,200
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
86/87
87/88
88/89
89/90
90/91
91/92
92/93
93/94
94/95
95/96
96/97
97/98
98/99
99/00
00/01
01/02
02/03
03/04RJO
Corn Used for Ethanol
Ethanol Production

Figure 3

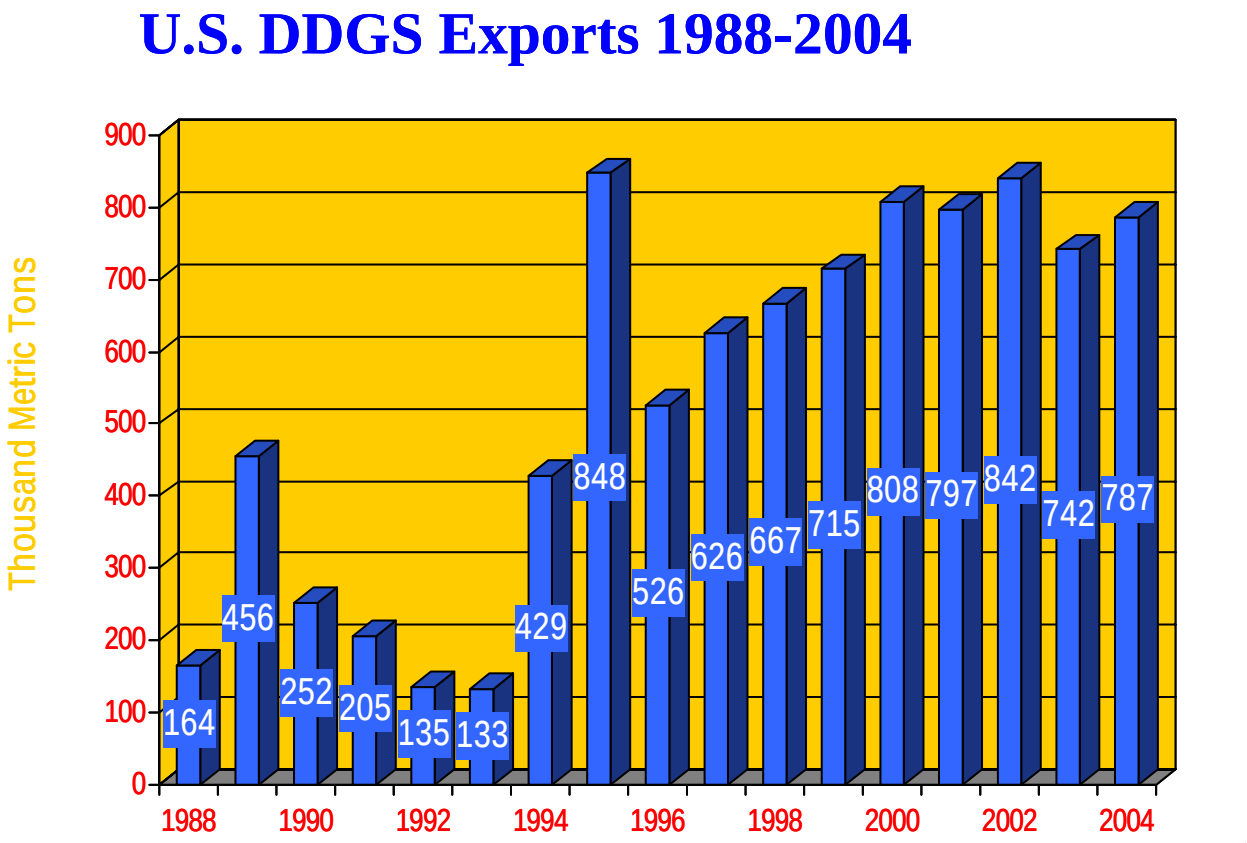

U.S. DDGS Exports 1988-2004
Thousand Metric Tons
900
800
700
600
500
400
300
200
100
0
1988
1990
1992
1994
1996
1998
2000
2002
2004
164
456
252
205
135
133
429
848
526
626
667
715
808
797
842
742
787

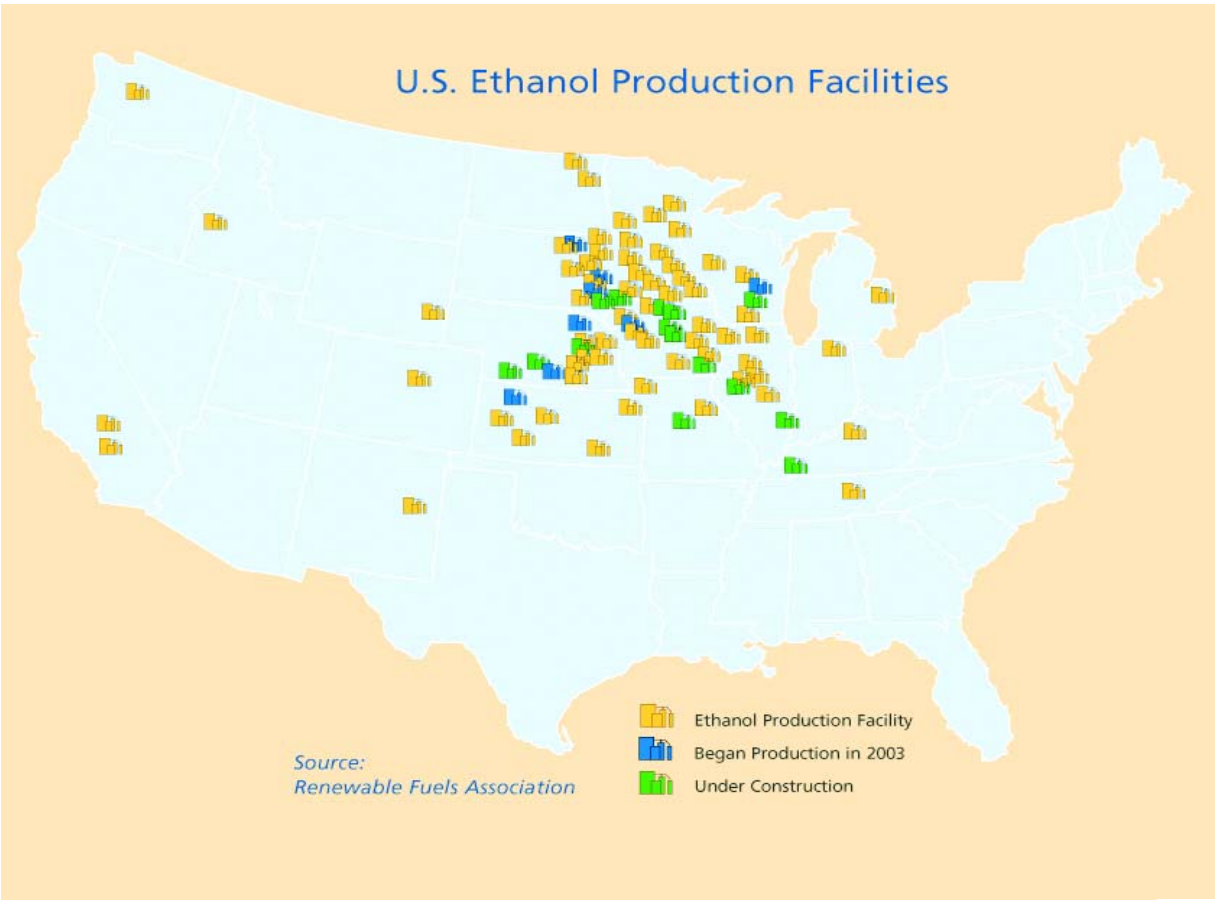
Figure 4

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREIGN AGRICULTURAL SERVICE

AREA/COUNTRIES OF DESTINATION	1999	2000	2001	2002	2003	2004
AUSTRALIA(*)		5		28		
BERMUDA				5		
BAHAMAS, THE				30		
CANADA	18305	21728	21260	30332	30898	82674
CHINA, PEOPLES REPUB					60	54
CHILE			33		3652	
COLOMBIA		40442	48495	37702	10140	3849
COSTA RICA				26323	1779	6600
DENMARK(*)	144317	127901	162543	106103	72265	NA
IRELAND	254127	219356	267265	297722	255398	185007
EL SALVADOR				192	380	129
FINLAND					380	2072
FRANCE(*)	20336	27427	2679	3000		
GERMANY(*)		47708	16168	28333	580	5144
GUATEMALA		3065	10070	3849	13131	3998
HONG KONG		88				
HONDURAS		912			1391	8024
INDONESIA						11516
ISRAEL(*)		2786			12380	6366
ITALY(*)	8085	12746		22032		
JAPAN	608	1466	26	40	15	
JAMAICA		4914				1490
KOREA, REPUBLIC OF			14		70	625
MALAYSIA						12682
MEXICO	22255	35718	31319	30751	45721	66894
MOZAMBIQUE				87		
NETHERLANDS	22697	16816	19439	14793	16445	36536
NICARAGUA						863
PANAMA				1247		1184
PORTUGAL	69614	97039	67666	74209	52221	73396
PHILIPPINES						958
QATAR		37				
PHILIPPINES				51		
SINGAPORE						163
SOUTH AFRICA, REPUBLIC OF						546
SPAIN	63040	69199	39324	74677	40169	77176
UNITED ARAB EMIRATES					82	
THAILAND	62				61	10
TAIWAN	57	80				7431
UNITED KINGDOM	91272	69235	111165	86612	184742	188857
VENEZUELA		9240		4023		1726
VIETNAM						633
TOTAL	714775	807908	797466	842141	741960	786603

Data Source: Department of Commerce, U.S. Census Bureau, Foreign Trade Statistics
(*) denotes a country that is a summarization of its component countries.

Figure 5



Building Energy Security One Ethanol Plant At A Time

CSC 2005

Figure 6

Figure 7

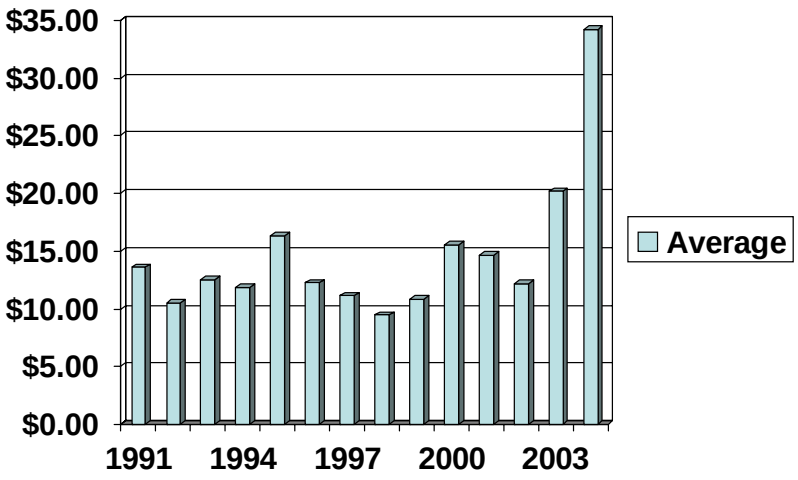
Rail Rates from the Central Corn Belt To the San Joaquin Valley in California

	Feb. '04	Feb. '05
Tariff Rate:	$3,682.00	$3,615.00
Fuel Surcharge:	2.5%	8.0%
Mileage Allowance:	($ 520.00)	$ 0.00
Current Lease Cost of 6351 Cu. Ft. Capacity Hopper:	$ 450.00/mo.	$ 630.00/mo.
Average Round Trip:	24 days	50 days
Actual Cost of Shipping:	$3,614.00	$4,984.00 **(diff. = $1,340.00)**

$14.00 per ton or a 27% freight increase in one (1) year

Figure 8

Average Monthly Freight Rates U.S. Gulf to Holland



Basis: 55,000 mt vessels
55 cu. ft. per long ton stowage (HSS)
Dollars per mt

Credit to Don Morrison,
The Rice Company-Krohn Div.

Figure 9

U.S. DDGS Consumption

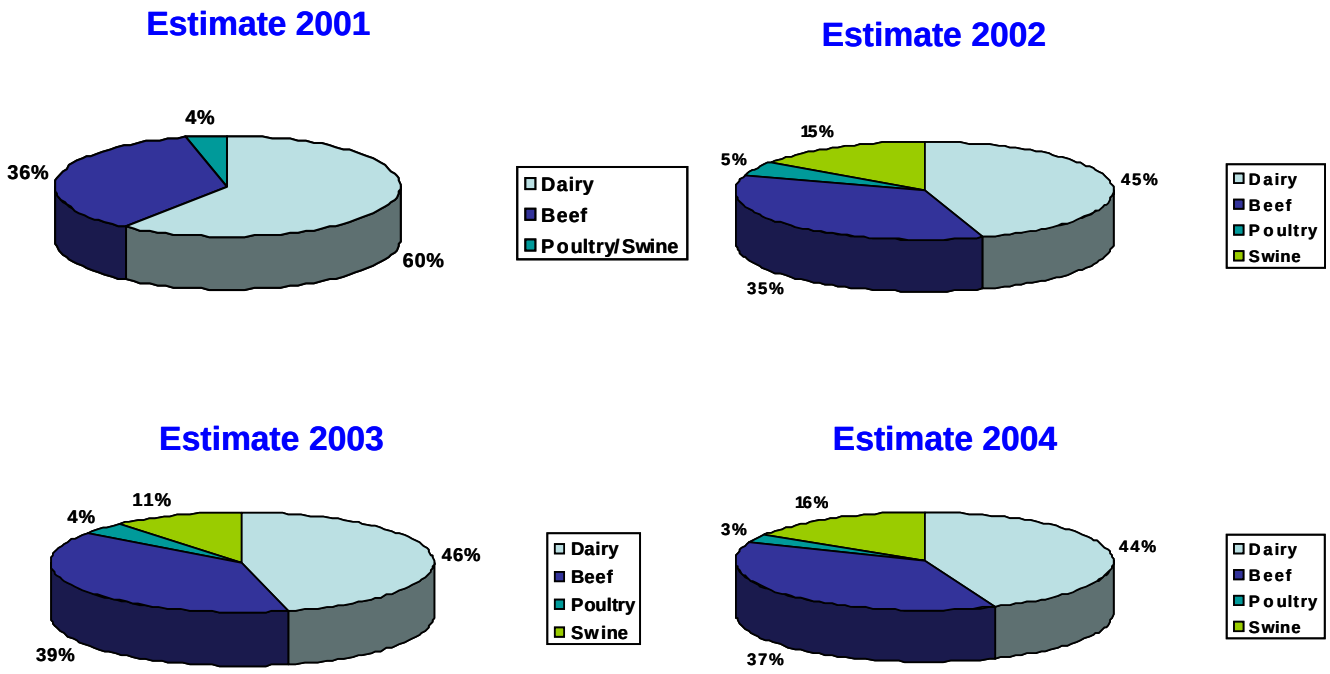
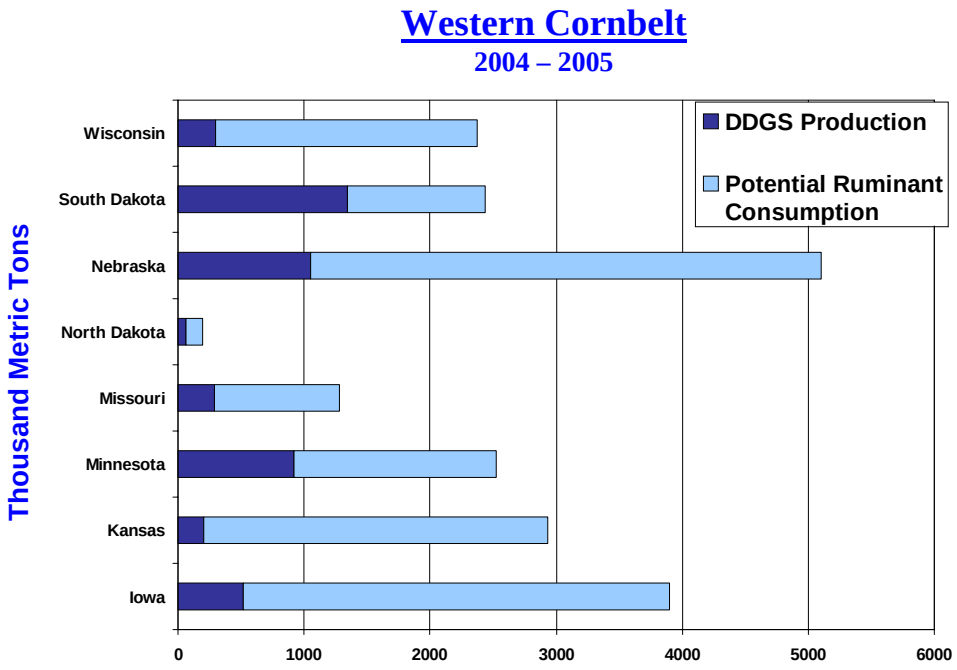
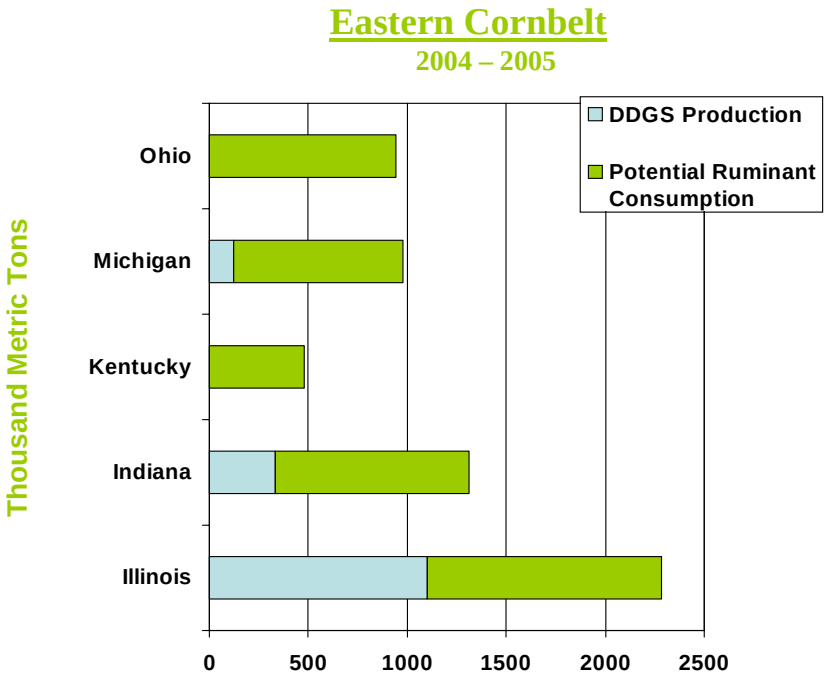


Figure 10



Data provided by The ProExporter Network

Figure 11



Data provided by The ProExporter Network

Figure 12

DDGS Comparison to Hi Pro Soybean Meal per Unit of Protein

		SMB $/unit of Ptotein	*DDGS $/unit of Protein*
	SMB $/unit of Ptotein	**1**	
$0.47	**DDGS $/unit of Protein**	**0.871915**	**1**

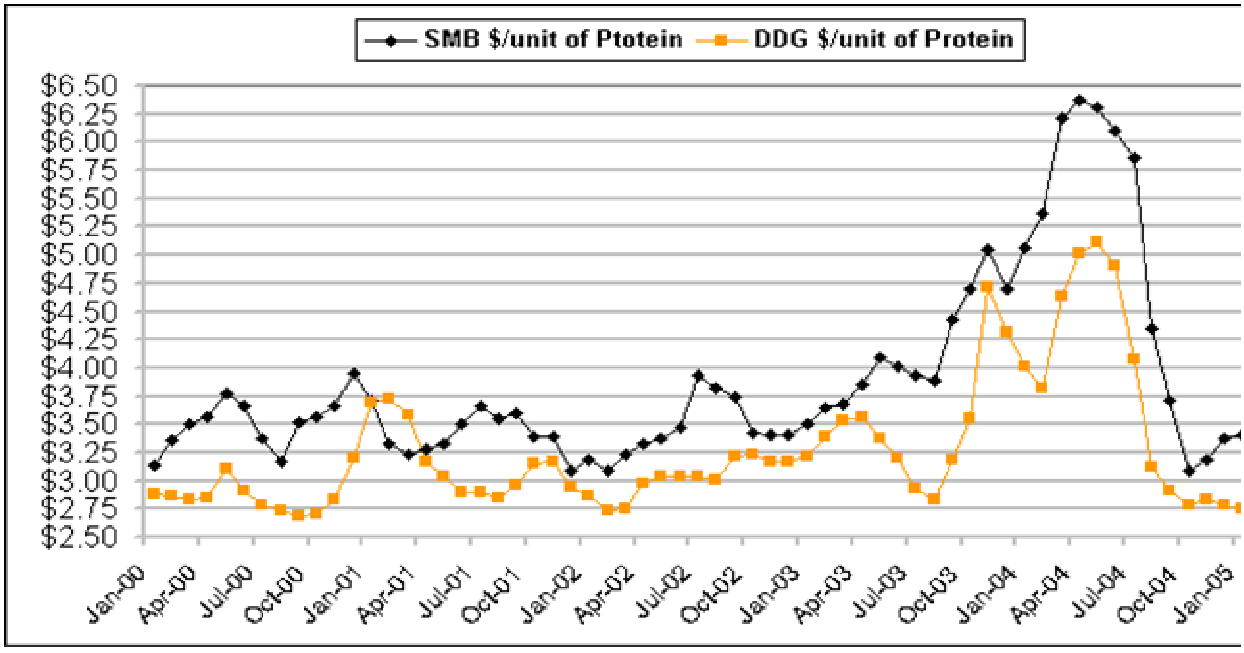
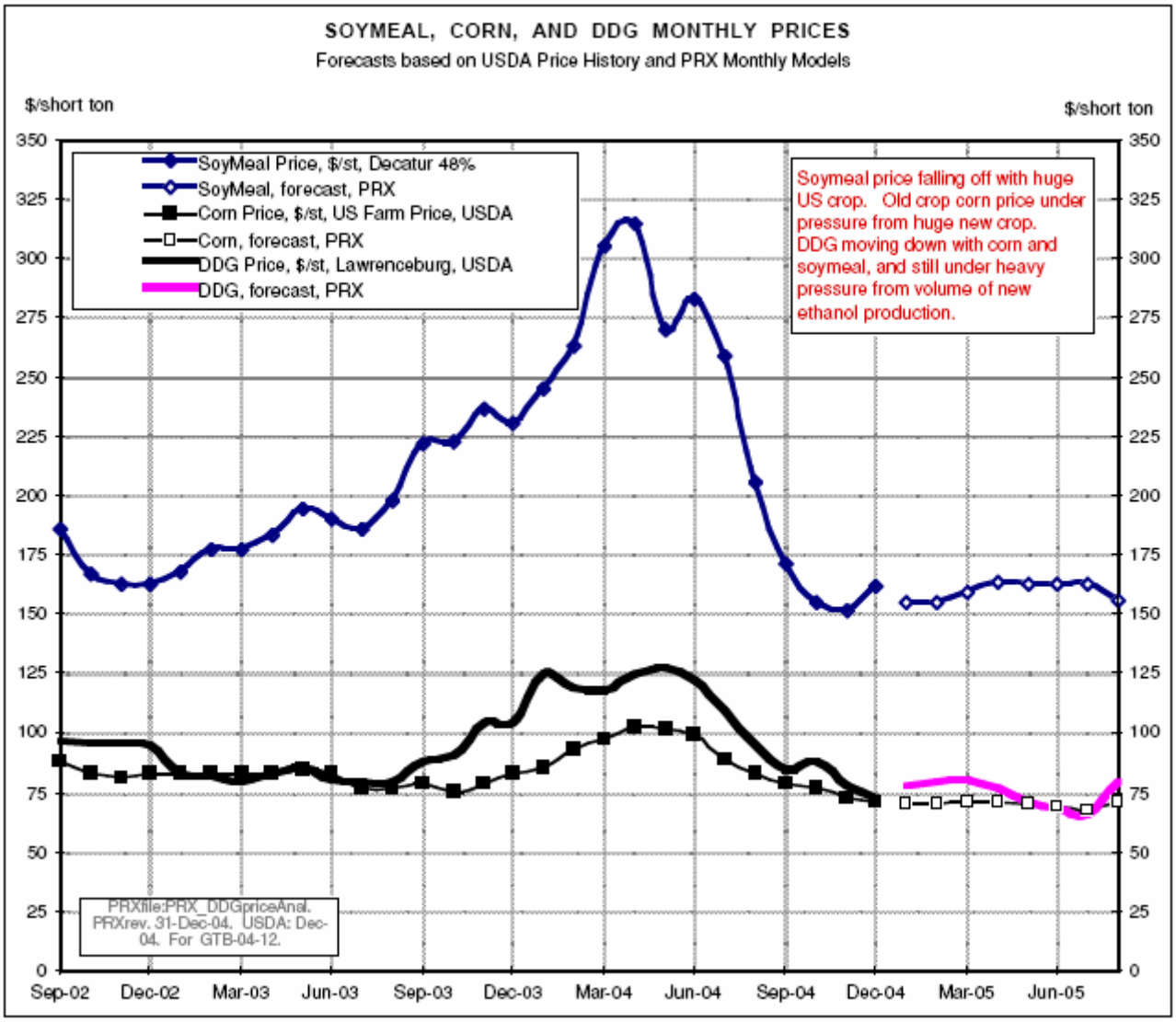


Figure 13

Soymeal, Corn, and DDG Monthly Prices



DDG Price Spreads vs. Lawrenceburg: IL, + 0 to +5; MN, -5 to -7; NE, +10 to +15. USDA Grain Market News.

Figure 14

AGRI-NUTRITION SERVICES
SHAKOPEE, MN

A typical swine Grower-Finisher Diet – 0.90% Lysine (Total) – Diet 1

INGREDIENTS	1	2	3	4	5
	(LB/TON)	(LB/TON)	(LB/TON)	(LB/TON)	(LB/TON)
Corn	1546	1367	1405	1416	1301
44% Soybean Meal	406	387	348	347	299
DDGS	---	200	200	200	364
18 ½ Dicalcium Phosphate	22	16	16	5	---
Limestone	14	18	18	18	21
Salt	6	6	6	6	6
Swine G-F Premix	3	3	3	3	3
L-Lysine, HCL	3	3	4.1	4.1	5.1
Phytase -- 1000	---	---	---	1.0	1.0
Total	2000	2000	2000	2000	2000

Figure 15

AGRI-NUTRITION SERVICES
SHAKOPEE, MN

Typical lactating dairy cow rations

	DIET 1		DIET 2		DIET 3	
INGREDIENTS	(As-Is)	(Dry Matter)	(As-Is)	(Dry Matter)	(As-Is)	(Dry Matter)
	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)	(lb/day)
Alfalfa Haylage	20.6	9.3	19.0	8.6	20.7	9.3
Corn Silage	20.7	7.3	18.9	6.6	20.4	7.2
Alfalfa Hay	5.0	4.5	5.0	4.5	5.0	4.5
Corn, High Moisture	17.5	13.8	16.0	12.7	15.5	12.2
44% Soybean Meal	3.8	3.3	3.5	3.1	3.5	3.1
Whole Cottonseed Meal	5.0	4.6	5.0	4.6	4.0	3.7
DDGS	---	---	4.0	3.5	4.0	3.5
Blood Meal	0.8	0.7	---	---	0.1	0.1
Sodium Bicarbonate	0.3	0.3	0.3	0.3	0.3	0.3
18 ½% Dicalcium Phosphate	0.3	0.3	0.2	0.2	0.2	0.2
Limestone	0.4	0.4	0.5	0.5	0.5	0.5
Salt	0.2	0.2	0.2	0.2	0.2	0.2
Magnesium Oxide	0.1	0.1	0.1	0.1	0.1	0.1
Dairy Premix & Yeast	0.1	0.1	0.1	0.1	0.1	0.1
Total lb/cow/day	**74.9**	**45.0**	**72.9**	**45.0**	**74.6**	**45.0**

Figure 16