DDGS Days at Long View

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Disclaimer:

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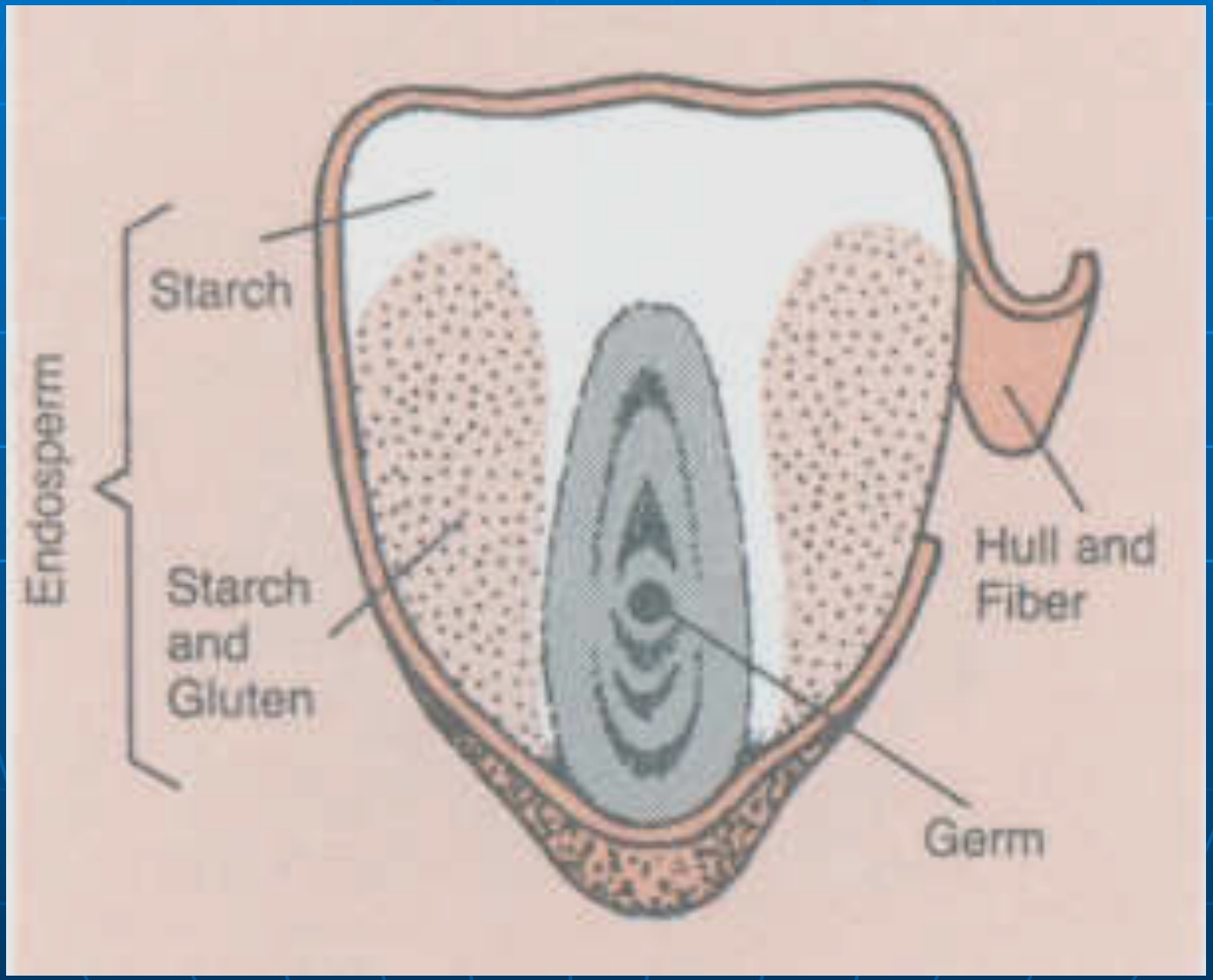
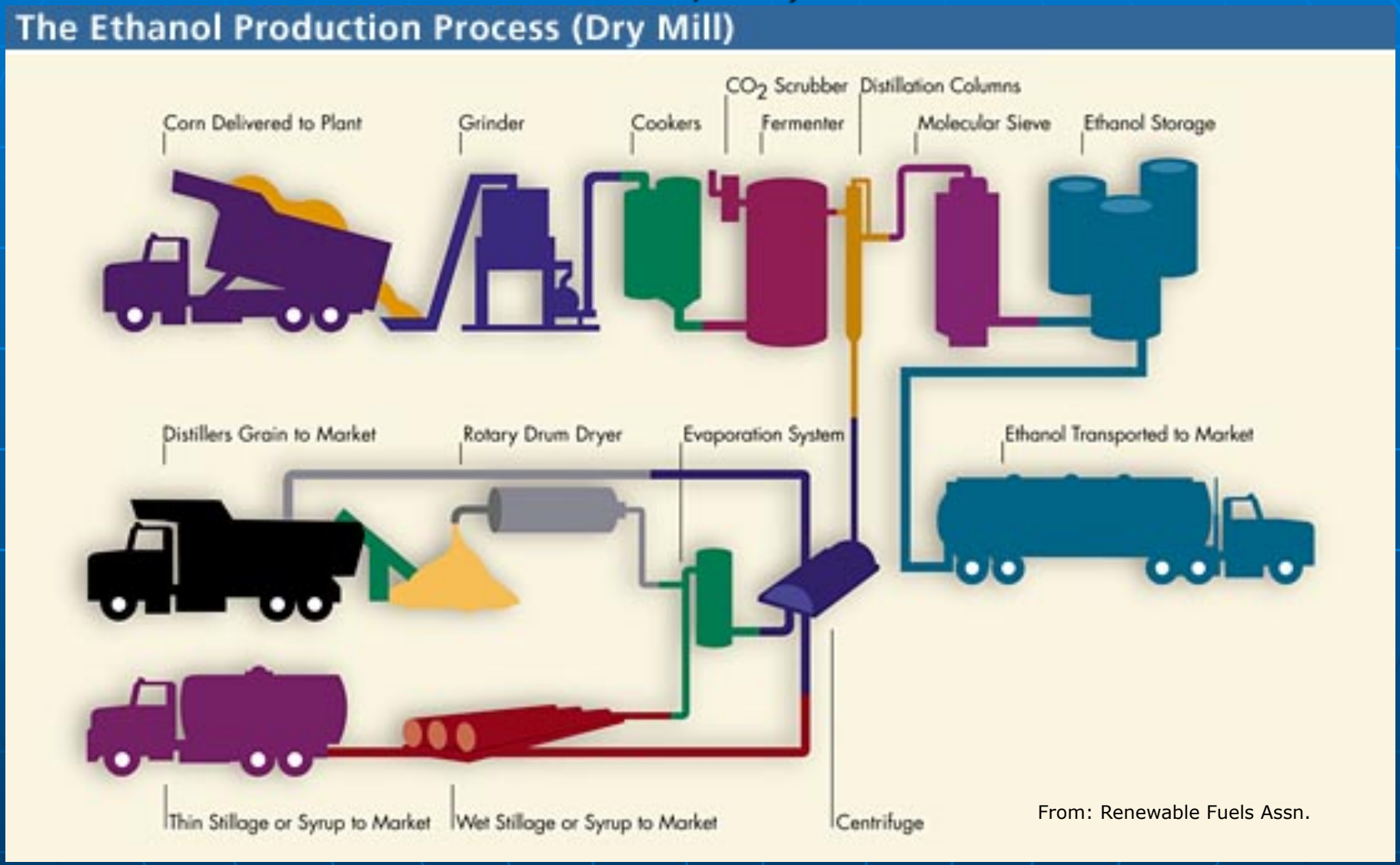
Corn Kernel

(Kent Tjardes, Ph.D., SDSU)



Dry Grind Process

(Dry Mill refers to processing dry corn into corn flour, grits, corn bran, etc.)



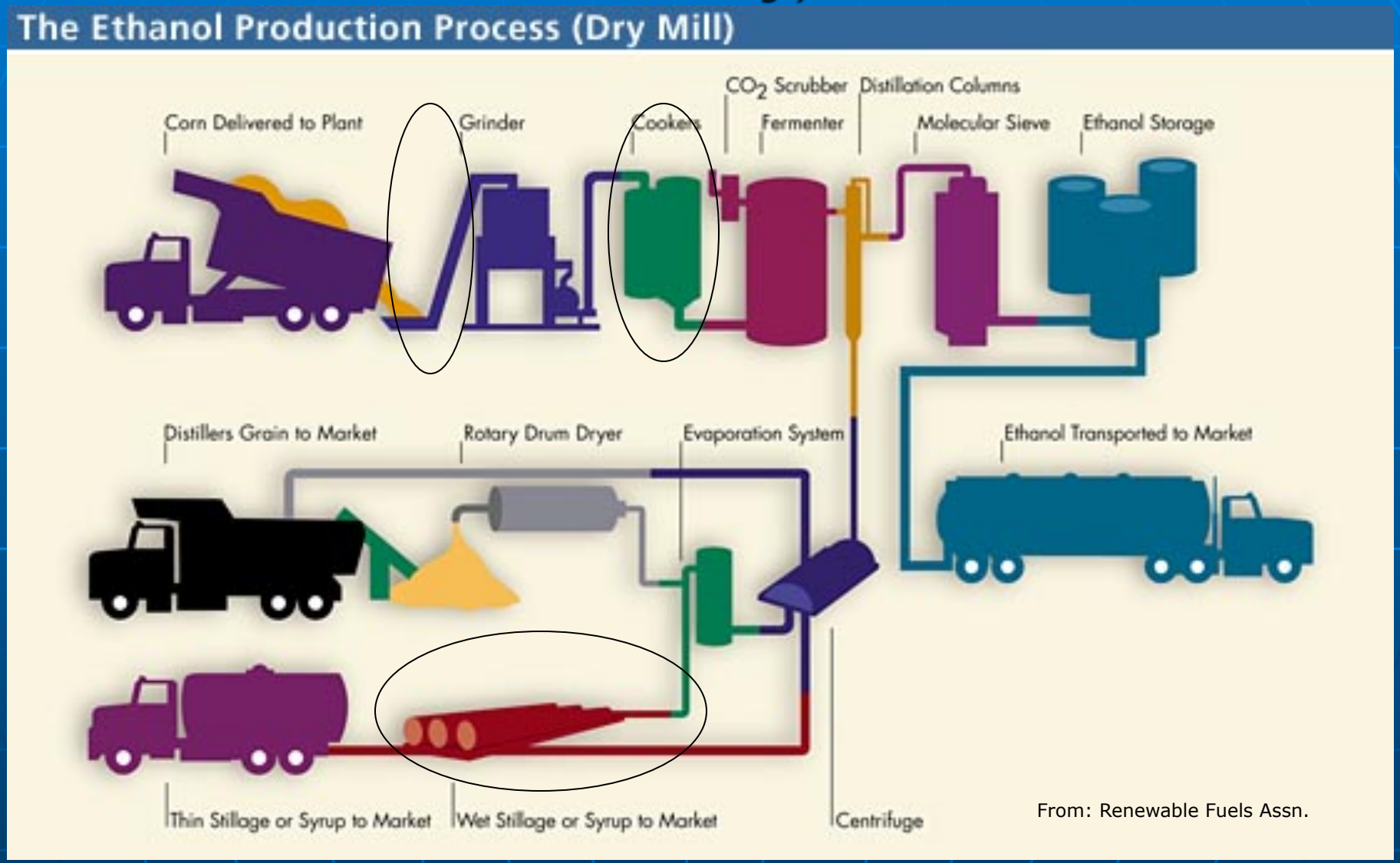
Dry-Grind Average Yield Per Bushel

1 bushel  becomes

- 2.7 gallons Ethanol
- 18 lbs DDGS
- 18 lbs CO_2

Dry Grind Process

(Fractionation areas : de-germing, eliminate cooking, and oil decanting.)

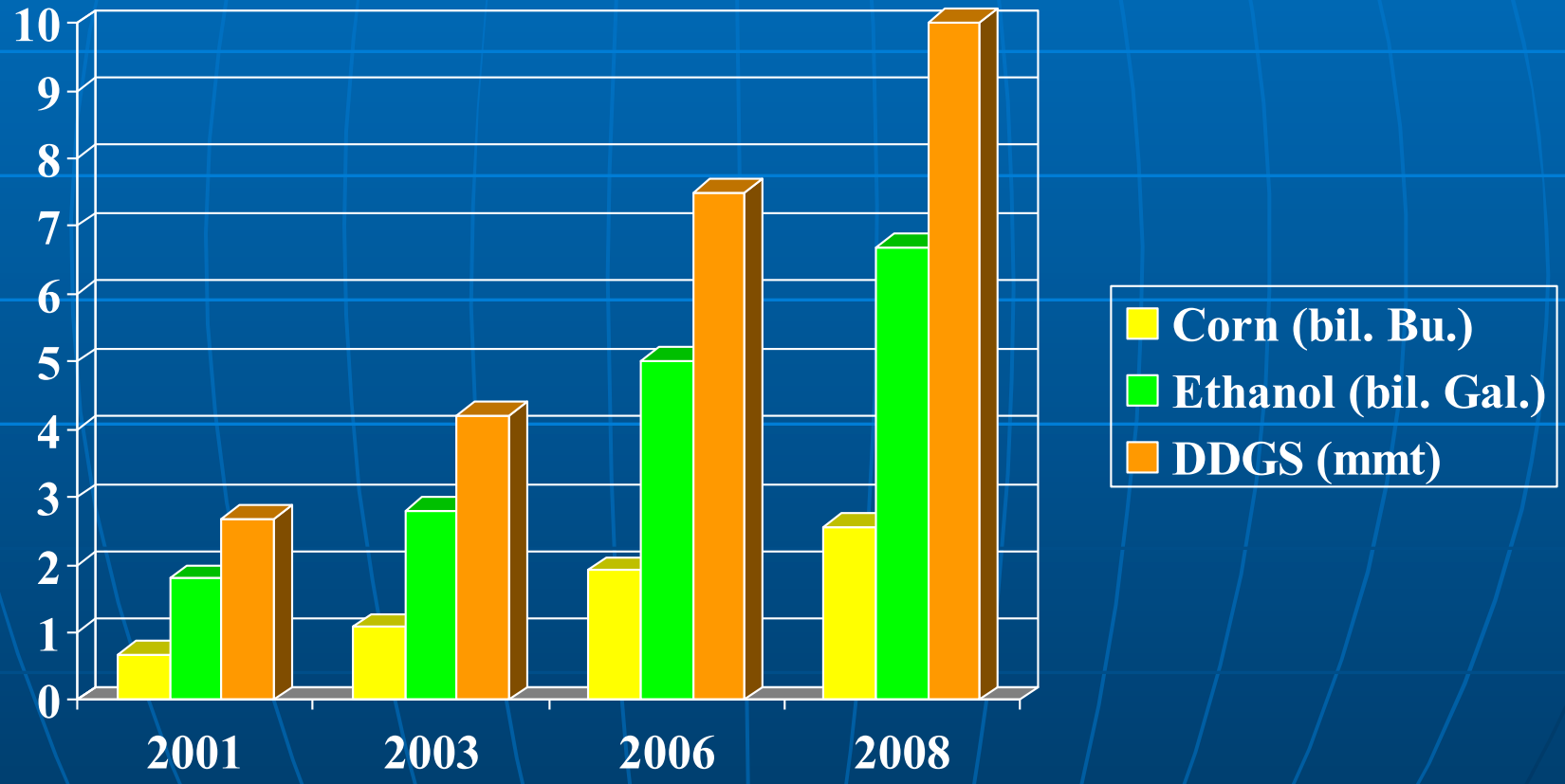


From: Renewable Fuels Assn.

Dry Grind Ethanol Production

- Most of the new growth in ethanol production is from dry grind plants.
- New Generations plants are very efficient and in most cases profitable.
- Rate of growth has many observers wondering how the marketplace will handle changing demands on corn supply and increasing availability of by-products.

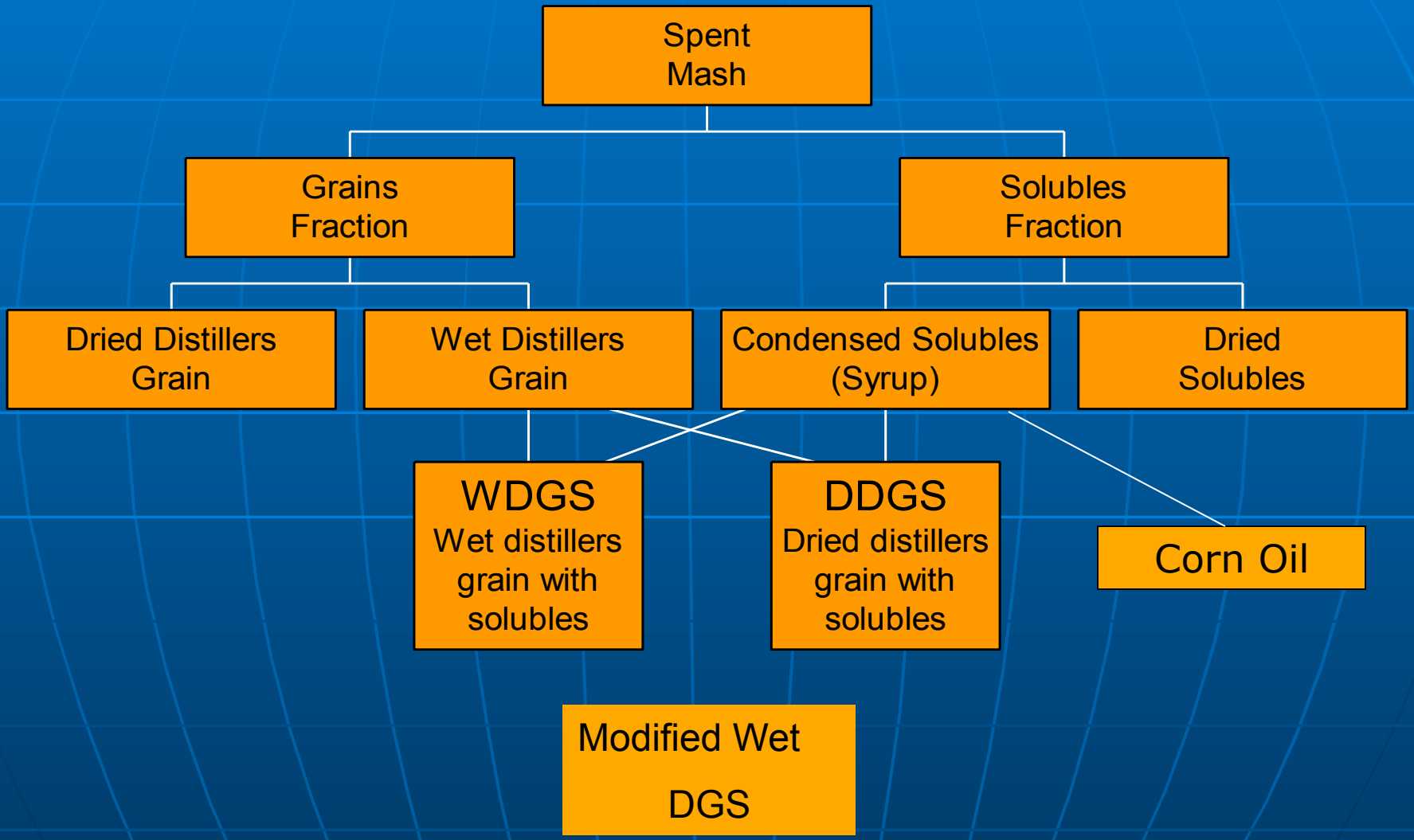
United States Ethanol Outlook



Nutrients Concentrate:

- 56 pounds of corn.
- remove the starch.
- add remnants of enzymes and yeast added to process.
- nutrients “concentrated” into 17 - 18 pounds of DDGS

Dry-Mill Ethanol Co-products



DDGS Nutrient Profile Comparison

Grains fraction compared to Solubles fraction*

Nutrient	Grains Fraction	Solubles Fraction
Dry Matter, %	**34.3**	27.7
Crude protein, %	**33.8**	19.5
Crude fat, %	7.7	**17.4**
Crude fiber, %	**9.1**	1.4
Ash, %	3.0	**8.4**
Calcium, %	0.04	0.09
Phosphorus, %	0.56	**1.30**

*Goihl, Knott, and Shurson: Random samples from 6 Minnesota ethanol plants taken over a three week period and tested at Iowa Testing Laboratories, Eagle Grove, Iowa. Mean values reported.

Fractionated Corn

- “Taking” something out of the corn or DDGS changes the product.
- Affect of de-germing corn on nutrient profile of distillers grains.
- De-canting oil off of solubles.
- Current claims of higher value co-products not widely accepted by feed industry.

Using Corn Distillers Grains in Animal Feed

- How much can we use
  - Theoretically?
    - Good source of protein and energy for dairy and beef cattle.
    - Good source of protein, fiber, phosphorus, and energy for swine and poultry.
    - Formulate diet to maximize use of nutrients when economically advantageous.

Using Corn Distillers Grains in Animal Feed

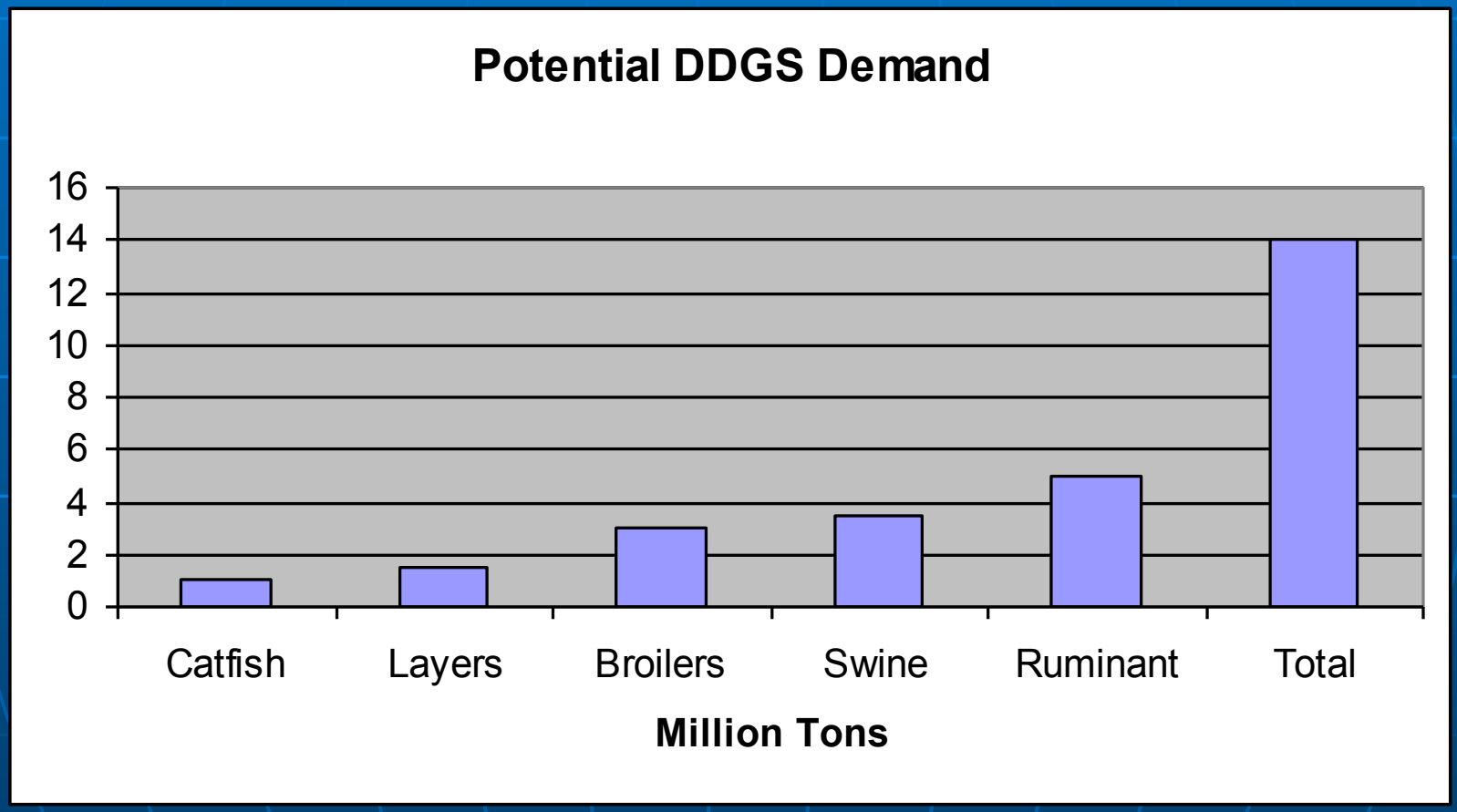
- How much can we use
  - Practically?
    - High phosphorus levels can limit use in areas where soil phosphorus level management is necessary.
    - Low lysine levels require amino-acid balancing, especially at levels of more than 10% of the diet for dairy, swine, and poultry.
    - High vegetable oil levels can have negative effects on feed intake and carcass characteristics.
    - Nutrient variation results in limiting inclusion levels by nutritionist to minimize potential nutrient variation in finished rations.

Using Corn Distillers Grains in Animal Feed

- How much can we use
  - Practically?
    - Physical characteristics challenges; flow-ability, micron size, pellet strength, etc.
    - Geography may limit timely access to dependable amounts of quality product.
    - Price compared to primary ingredients.
    - Price compared to other mid-protein ingredients.

Potential use of DDGS

(Land O’ Lakes 2002)



2004 DDGS Use

- 6.928 million tons of distillers grains produced
- 6.078 million tons were consumed domestically
  - ruminants consumed about 75-80% of the production (approx. 4.862 million tons)
  - swine, poultry, aquaculture and companion animals (approx. 1.216 million tons)
- 786,603 tons were exported

DDGS Exports

- According to FAS's Export Trade Data (US Customs), total exports of DDGs (including brewers and distillers) were as follows (Calendar Year):
  - 2005: 900,000 metric tons (LOL est.)
  - 2004: 786,603 metric tons
  - 2003: 741,639 (FAS/USDA)
  - 2002: 842,141
  - 2001: 797,466
  - 2000: 807,908
  - 1999: 714,775

DDGS Exports

- US Grains Council is promoting DDGS
  - Pacific rim countries
  - Europe
  - Canada, Mexico, Central, and South America
- Veracruz, Mexico DDGS demonstration in beef, dairy, and swine
  - Joint effort of Iowa Corn Growers DDGS promotion and USGC.

USGC DDGS Project in Mexico

Corn DDGS Value…
…it depends on:

- Nutrient concentration
- Nutrient digestibility or bio-availability
  - Energy
  - Amino acids
  - Phosphorus
- Physical properties of product
- Species
- Market price of competing ingredients
- Other factors

Corn DDGS Variation

Photo: www.ddgs.umn.edu

Sources of DDGS variabiity:

- **Incoming grain**
- **The fermentation process.**
- **Percent of the soluble production blended with the wet grains during the drying process.**
- **Drying process.**

Testing Variation

One DDGS Sample – Six Labs

Land O' Lakes Purina Feed, LLC. – April 2005

Split Sample	Moisture	Fat	Protein
1	12.69	13.73	26.00
2	10.48	10.01	26.30
3	10.09	10.04	27.30
4	10.64	8.73	26.13
5	13.30	10.15	26.29
6	12.60	9.40	25.00

Value of Using 200 lb Per Ton of Golden DDGS in Swine Feed			
(available lysine in DDGS)	~63%		~90%
Ingredient Prices	$/ton		$/ton
Corn	$ 78.54	$ 2.20	$78.54
Hi-Pro Soybean Meal	$ 190.00		$190.00
Dicalcium Phosphate, 18.5%	$ 380.00		$380.00
DDGS (Golden)	$ 95.00		$95.00
Limestone	$ 65.00		$65.00
Savings from using 200 lb DDGS	**$ 0.47**	/ton of feed	**$1.02**
Break-Even Price for DDGS	**$ 99.65**	/ton DDGS	**$105.23**

DDGS Relative Value Differs Depending on Species

Assumptions:

- **Corn** $2.00 / bu
- **SBM** $175.00 / ton
- **Urea** $360.00 / ton
- **Non-ruminant diets corn/SBM**
- **Ruminant diets typical diets with competing by-products.**

Feed	Dollars/ ton
Dairy Lactation	$114.24
Poultry Finisher	$100.09
Layer Diet	$104.66
Swine G-F Diet	$96.34
Beef Feedlot	$108.00

DDGS: other factors.

In poultry:

- 10% DDGS in diet maintains performance of layers, broilers, and turkeys.
- Can be used to produce darker yellow yolks
- Can be used to produce a yellowish fat and possibly breast meat (?)
- Know the sodium content

DDGS in Poultry

- Broilers could use about 1 pound per bird
- Laying hens could consume about 8.7# per hen per year, or about 4300 tons of DDGS/million hens/ year.

DDGS: other factors.

In swine:

- 10% DDGS in diet in grow/finish and up to 40% of sow gestation diets.
- See less use in nursery and lactation diets
- Many producers report a “gut health” benefit

Land O' Lakes Feed Suggested Swine Ration Inclusion Levels:

Nursery:	**5%**
Grow-Finish:	**10%**
Sow Gestation:	**20%**
Sow Lactation:	**5%**

DDGS: other factors.

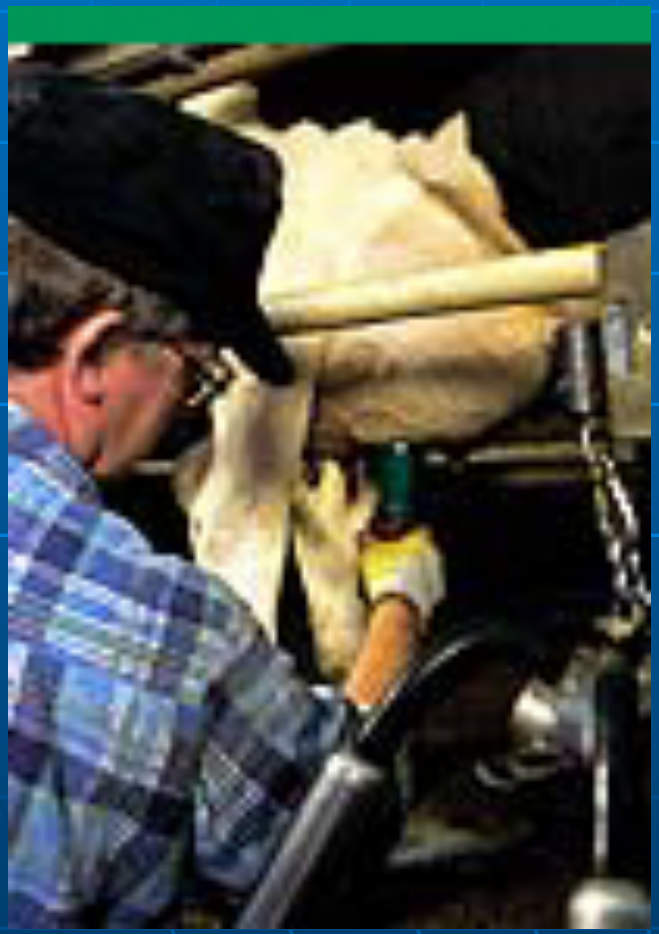
In beef cattle:

- Up to 15% DDGS in diet competes with other protein sources in value.
- Over 15% DDGS in diet competes with other energy sources in value.
- Reduces incidence of acidosis and associated problems.

FEEDING RECOMMENDATIONS DISTILLERS GRAINS (Beef)

- Maximum 6-15% of diet DM as Protein Source (1-2 lbs/d)
- Maximum 20-40% of diet DM as Energy Source (4-8 lbs/d)
- Maximum 30% of diet DM for cows (8 lbs/d)
- Balance CP, DIP, UIP
- Watch Mineral Balance (Ca:P)
- Effective NDF content of distillers grains is limited
  - ❖ Does not replace <u>all</u> roughage sources

DDGS: other factors.



In dairy cattle:

- Excellent protein source
- High by-pass protein.
- Replaces corn & soybean meal, not forage.
- Need to balance lysine.
- Reduces incidence of acidosis and related problems.

Example Ration Considerations for Dairy Cattle

Diets containing 50:50 forage:concentrate

1) If equal proportions of Alfalfa & Corn Silage:

Distillers Grain can replace most or all protein supplement

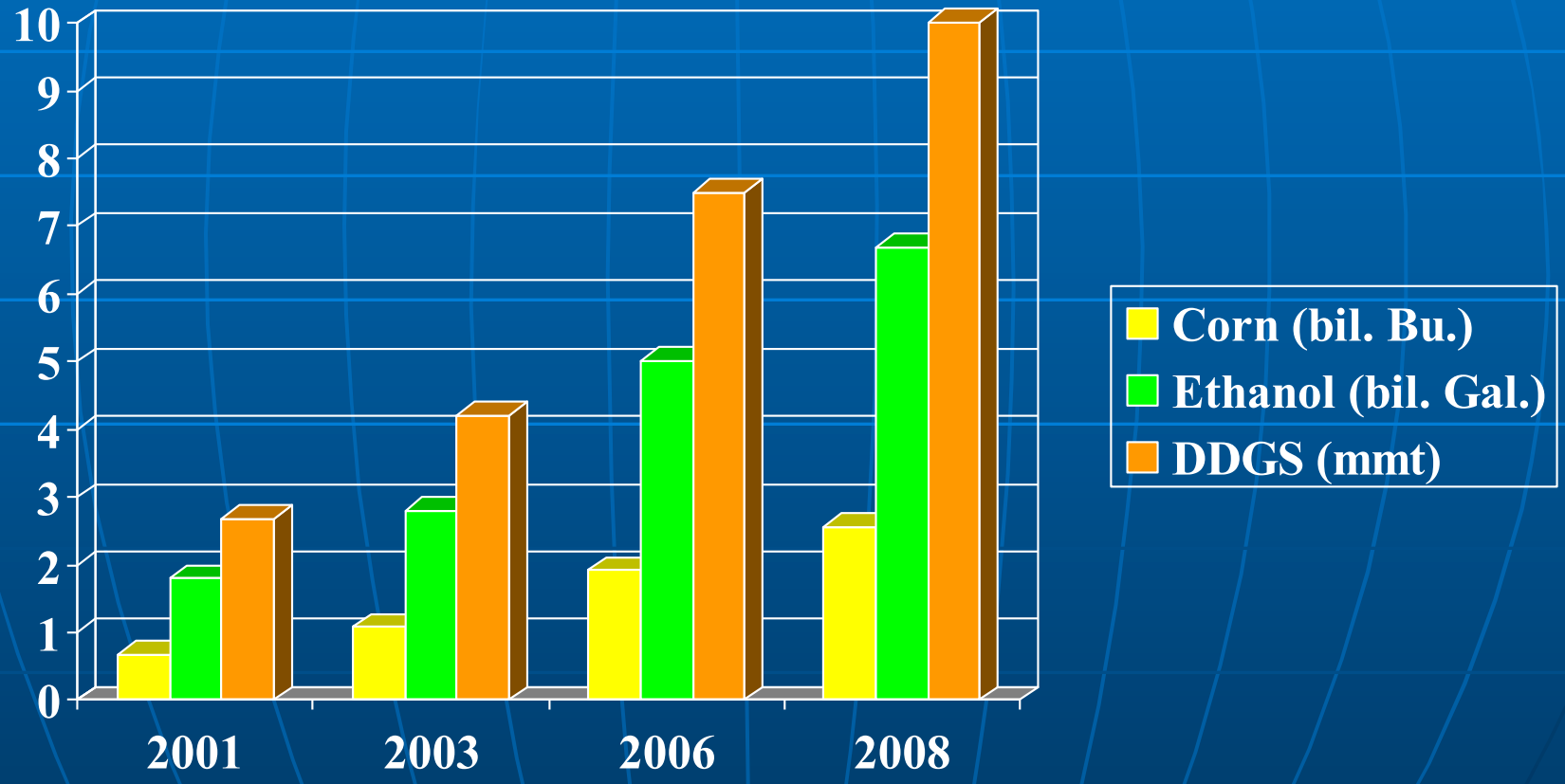
2) If mostly corn silage:

More Distillers Grain can be fed but may need some other protein supplement, check Lysine, & P

3) If mostly alfalfa:

Less Distillers Grains likely needed to supply diet CP

United States Ethanol Outlook



Ethanol Taking More Corn in Top States

Grain Service Corp. Top Producer p. 38 March 2005

2004	**Ethanol produced** (mil. gal./yr.)	**Corn for Ethanol** (mil. bu.)	**Future Corn need** (mil. bu.)	**Total Eth Corn** (mil. bu.)	**Proj. 04 Total Use** (mil. bu.)	**% State Corn Production**
Iowa	1,258	361	142	503	2,200	23%
Illinois	818	307	20	327	1,870	17.5%
Nebraska	533	213	0	213	1,275	16.7%
Minnesota	521	210	50	260	1,050	24.8%
South Dakota	451	181	0	181	475	38.1%
Wisconsin	210	52	32	84	380	22.1%
Kansas	102	41	17	58	na	na
Missouri	100	40	0	40	370	10.8%
U. S.	2,810	1,124	301	1,425	10,770	13.2%

Midwest Ethanol Production

Brock Report, Dec 3, 2004 (Millions of gallons)

State	Current Production	Under Construction
South Dakota	390	14
Minnesota	389	89.5
Wisconsin	109	80
Illinios	615	70
Nebraska	422	112
Iowa	716	300

Ethanol Production for April 2005

April Production	299.7 mil gal
April Use	291.3 mil gal
Stocks	286.6 mil gal
US Exports	0.47 mil gal
US Imports	3.1 mil gal