Corn DDGS: A Feed Industry Perspective

Contact Information:

- **Harold Tilstra, DVM**
- **National Co-Products Technical Support**
- **Land O' Lakes Farmland Feed, LLC**
- ***Home Address: 583 110th Avenue Luverne, MN 56156***

- ***Office Phone: 507-283-4198***
- ***Cell Phone: 507-220-5952***
- ***E-mail: hdtilstra@landolakes.com***
- ***Web Site: www.ddgsnutrition.com***

Disclaimer:

All numbers, projections, and the like contained herein regarding costs, expenses, production results, etc., are for ILLUSTRATIVE PURPOSES ONLY. The assumptions utilized and the resulting projections may not be appropriate for a given situation. Actual results could vary significantly. Land O' Lakes Farmland Feed makes no warranties, expressed or implied, regarding any such projections.

Corn DDGS: A Feed Industry Perspective

Dr. Harold Tilstra
Land O’ Lakes Feed

Overview

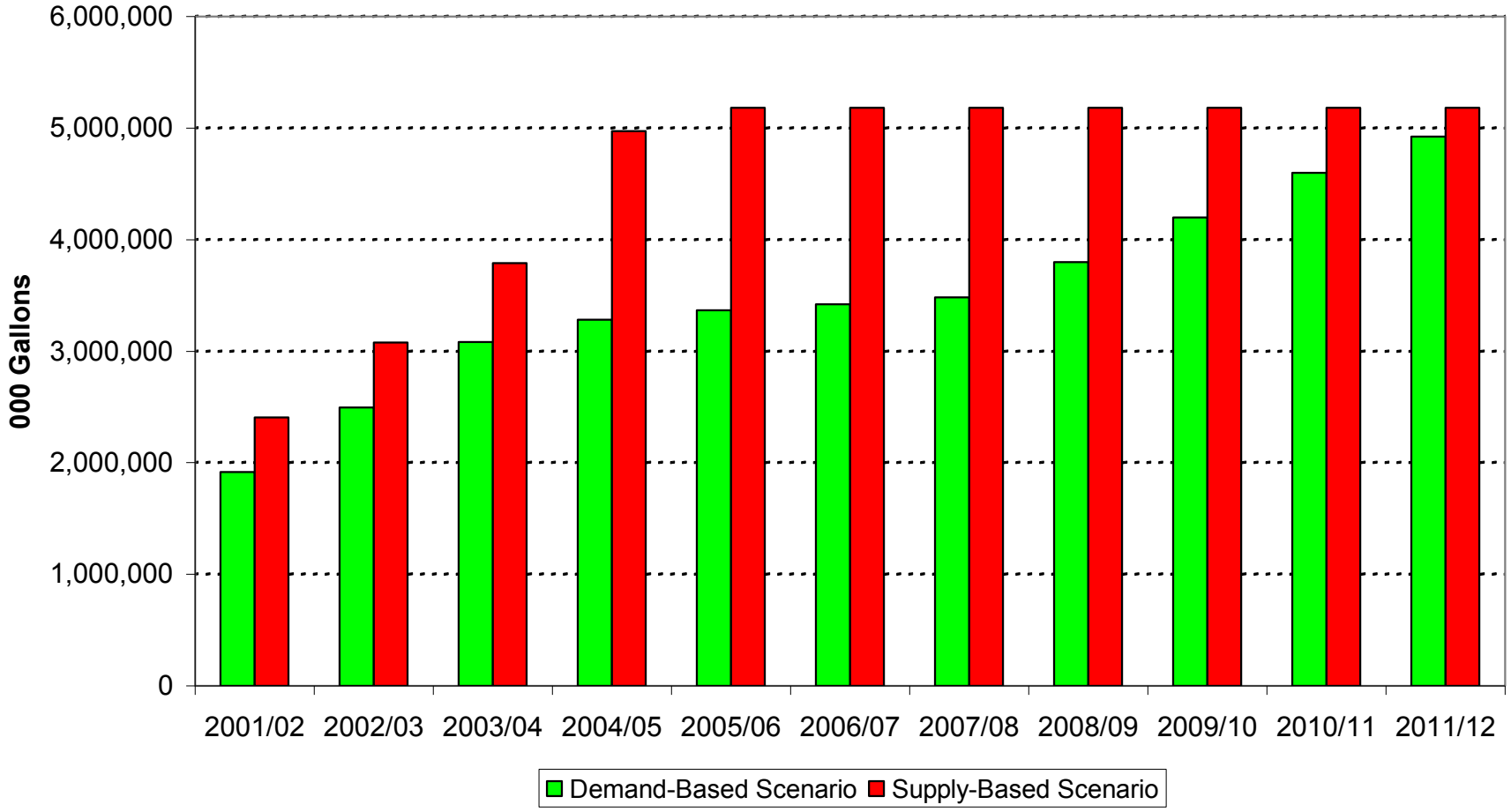
- DDGS: Supply
- DDGS: Use
- DDGS: Value
- DDGS: other factors
- Summary

DDGS Supply

- Ethanol production expansion to 5 billion gallons.
- DDGS supply will grow to nearly 9 mmt per year.
- Increasing supply not driven by feed demand.
- “Biggest change to feeding animals since soybean meal.”

Ethanol Volume Forecasts (Oct.-Sep. Crop Year)

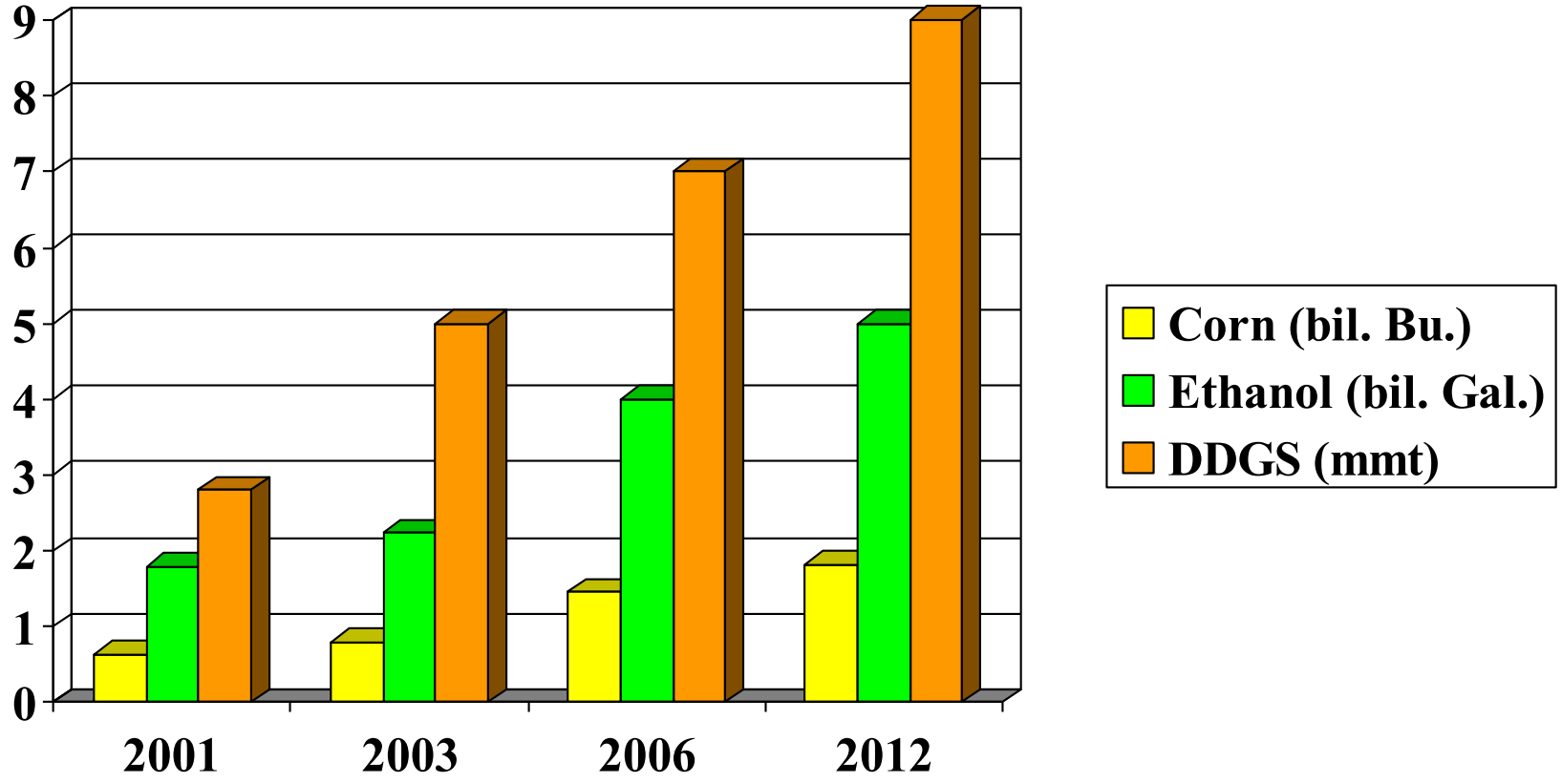
(Sparks Study funded by Land O' Lakes, 2003)



Supply based on 2002 CA Energy Commission survey of U.S. ethanol capacity through 2005; static after 2005.
Demand based on combination of MTBE bans in 19 states & Energy Bill including Renewable Fuels Standard

United States Ethanol Outlook

Land O' Lakes 2002

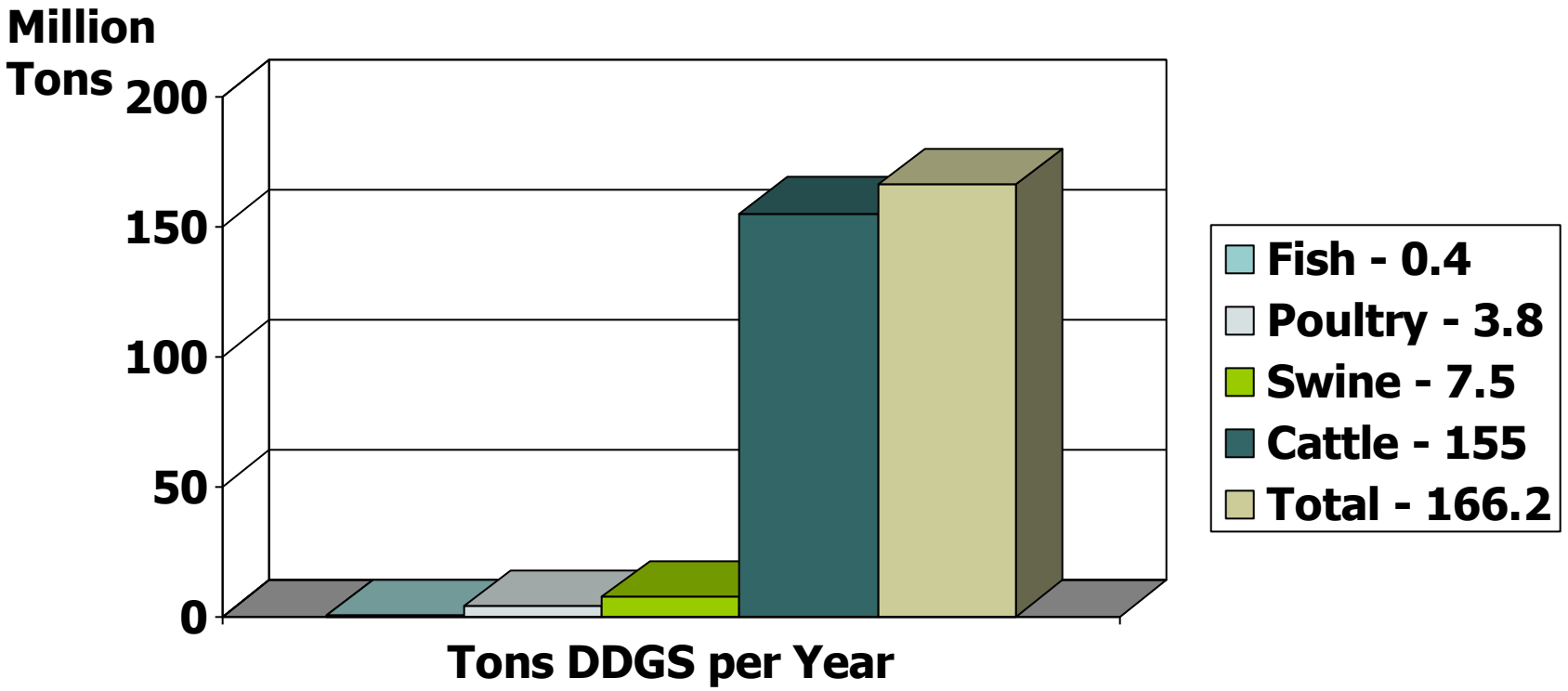


Using Corn Distillers Grains in Animal Feed

- 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.

Maximum Theoretical, Potential DDGS Usage

(Sparks Study funded by Land O' Lakes, 2003)



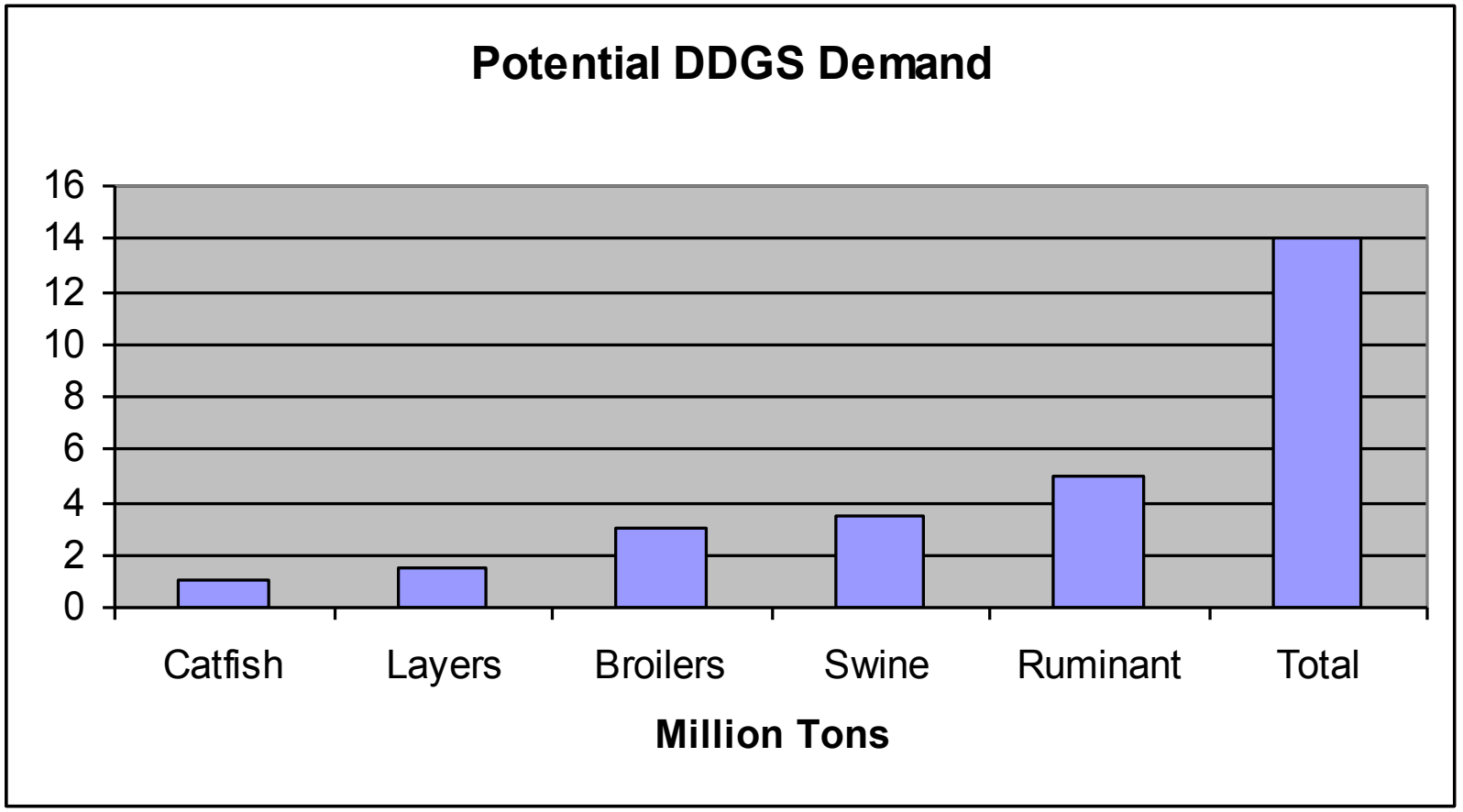
Using Corn Distillers Grains in Animal Feed

- 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.

Using Corn Distillers Grains in Animal Feed

- How much can we use
  - Practically?
    - Physical characteristics challenges; flow-ability, micron size, pellet strength, etc.
    - Nutrient variation results in limiting inclusion levels by nutritionist to minimize potential nutrient variation in finished rations.
    - 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)



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

Value of DDGS: 1. Two Nutrient Profiles

	DDGS (NRC)	"Golden" DDGS
ME, kcal/lb	1,282	1,452
C. Protein, %	27.7	26.9
C. Fat, %	8.4	9.7
Lysine, %	.62	.76
Dig. Lys., %	.29	.40
P, %	.77	.79
Av. P, %	.59	.63

Value of DDGS: 2. Two Price Scenarios

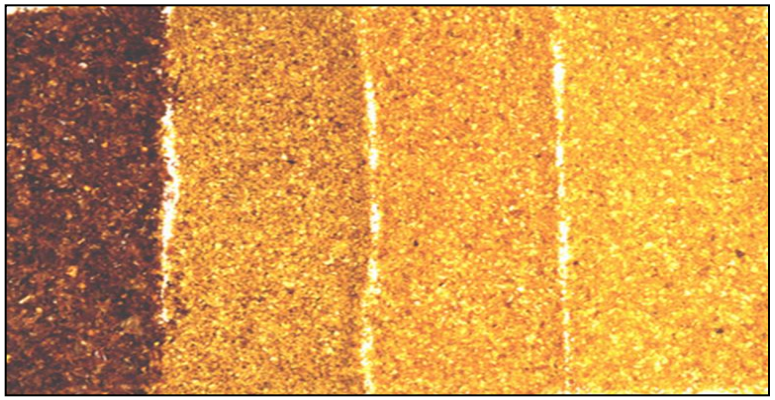
- **Low Prices**
  - **Corn = $1.93/bu**
  - **Hi-Pro SBM = $163.50/ton**
  - **L-Lysine.HCl = $70/ cwt**
  - **No added fat**
- **High Prices**
  - **Corn = $3.05/bu**
  - **Hi-Pro SBM = $320/ ton**
  - **L-Lysine.HCl = $200/ cwt**
  - **No added fat**

Value of DDGS: 3. Two Value Estimations

	NRC DDGS	"Golden" DDGS
Shadow Price (low prices)	$87.73	$92.83
Shadow Price (high prices)	$151.80	$159.00
Amount Used (low prices)	106 lb/ton	165 lb/ton
Amount Used (high prices)	8 lb/ton	0 lb/ton
Price to use 200 lb/ton (low prices)	$66.45	$84.41
Price to use 200 lb/ton (high prices)	$123.40	$158.80

Nutrient digestibility or bio-availability - Lysine

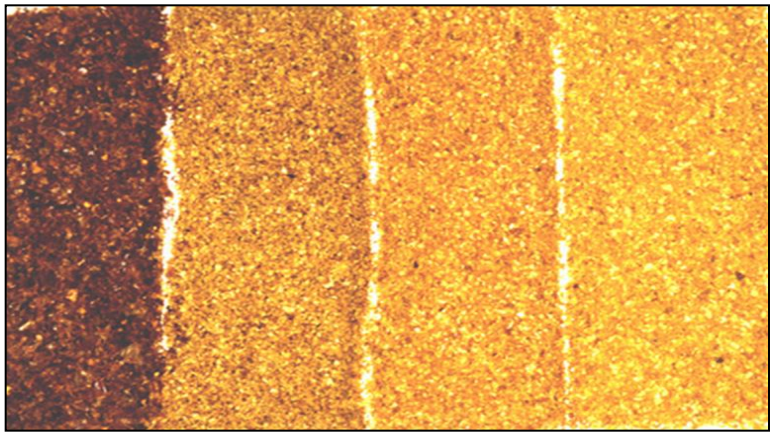
- **Research published in 2003 correlates color (in terms of lightness and yellowness) to lysine digestibility.**
- **In turkey grower diets, DDG's with low or high (60% vs. 78%) lysine digestibility showed DDGS values of:**



Ingredient/price	Low lysine DDGS	High lysine DDGS
Corn, $1.74 / bu	$85.60 / ton	$95.60 / ton
Corn, $1.96 / bu	$90.80 / ton	$100.00 / ton
Corn, $2.97 / bu	$114.00 / ton	$120.40 / ton
SBM, $165 / ton	$90.80 / ton	$100.00 / ton
SBM, $174 / ton	$94.40 / ton	$104.20 / ton

Nutrient digestibility or bio-availability - Phosphorus

- In swine grow/finish diets; available phosphorus is a significant part of value.
- Calculated value of DDGS with high to low available phosphorus at various corn prices:



Corn/SBM	90% A. Phos.	80% A. Phos.	60% A. Phos.
$2/$250	$95.22	$93.64	$90.59
$2.5/$275	$112.59	$111.07	$108.14
$3/$300	$129.96	$128.50	$125.68

Physical properties of product

Sent to a happy customer

Sent back from a not-so-happy customer

Physical properties of product

- Bulk density – affects freight cost
  - Range is 31 – 39 pounds/cu. ft.; could be 20% less weight shipped in a rail car or container.
- Micron size – affects mixing and handling characteristics
  - Matching finished feed is best for mixing.
  - Too small (talc powder) makes difficult to handle.
- Pelleting –
  - Pelleted DDGS would be easier to handle for shippers.
  - Adding DDGS to finished feed can result in poorer pellet quality and/or decreased through-put of pelleting machine.
- Syrup balls –
  - Generally, not related to reduced nutrition value.
  - If re-grinding required, adds cost, reducing value.

DDGS Relative Value Differs Depending on Species

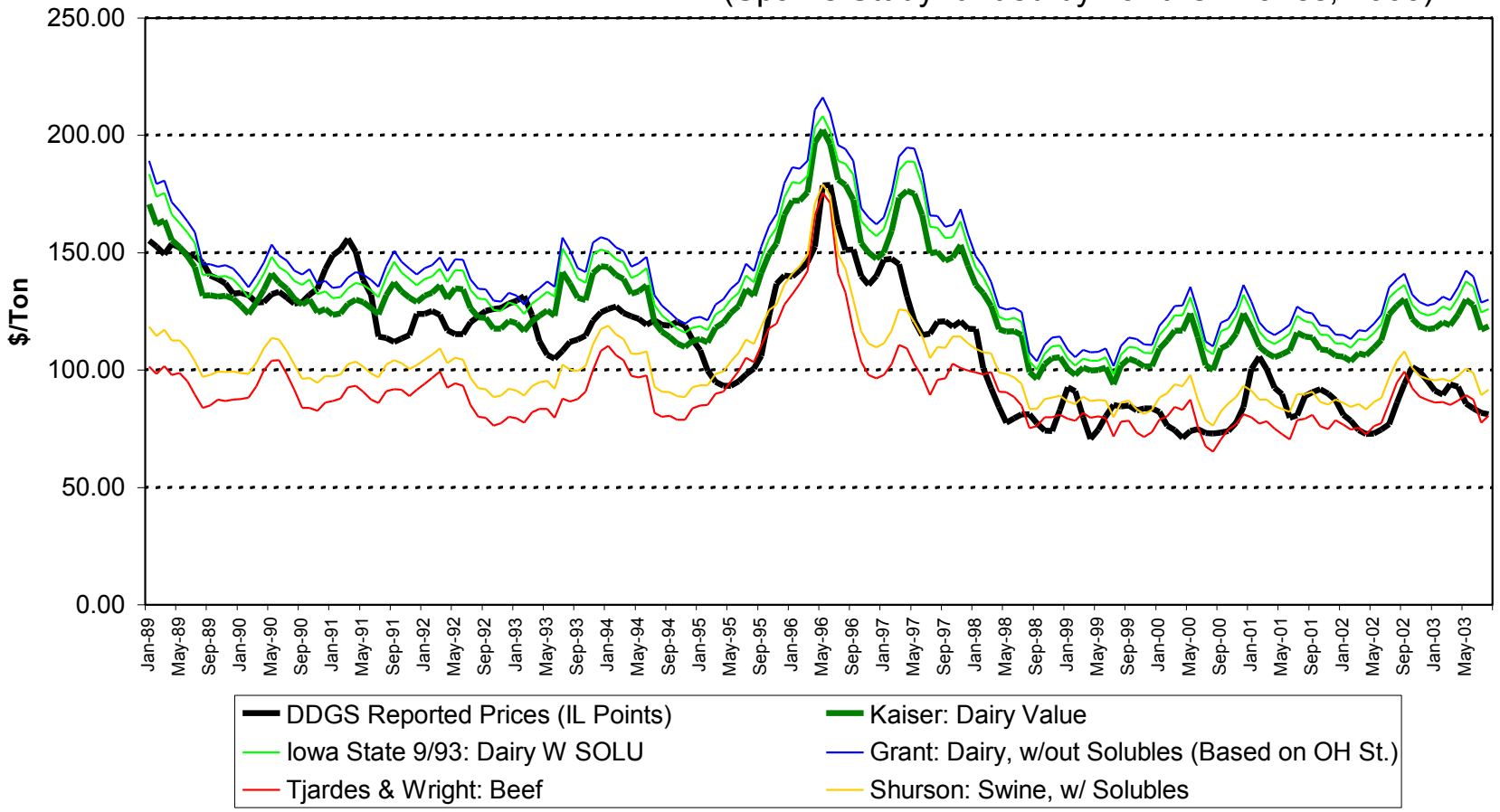
Assumptions:

- **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: USDA Reported Prices vs. Theoretical Nutritional Value

(Sparks Study funded by Land O' Lakes, 2003)



Value of By-Products for Beef

	Cost	DM%	NEg	CP%	Ratio
Corn per bushel	**$3.05**	**88.0**	**66**	**9.5**	
Hi Pro Soybean Meal per ton	**$320**	**89.0**	**65**	**53.4**	**25%**
Feed Grade Urea per ton	**$490**	**99.0**	**0**	**286**	**75%**

		100% DM		Maximum Value per Ton, delivered		
		NEg		Energy	Protein	**Total**
Commodity	DM %	Mcal/cwt	CP %	Value/ton	Value/ton	**Value/ton**
Corn Screenings	86	52	9.5	$67	$21	**$88**
Corn Gluten Feed, Dry	90	63	20	$85	$47	**$132**
Corn Gluten Feed, Wet	40	63	20	$38	$21	**$59**
Cottonseed, Whole	91	72	23	$98	$54	**$153**
Distillers Grains, Dry	88	66	28	$87	$64	**$151**
Distillers Grains, Wet	30	66	30	$30	$23	**$53**
Distillers Syrup	30	80	30	$36	$23	**$59**

Value of Using 200 lb Per Ton of Golden DDGS in Swine Feed		
(~63% available lysine in DDGS)		
Ingredient Prices	**$/ton**	
Corn	$ 108.89	$ 3.05
Hi-Pro Soybean Meal	$ 320.00	
Dicalcium Phosphate, 18.5%	$ 380.00	
DDGS (Golden)	$ 140.00	
Limestone	$ 65.00	
Savings from using 200 lb DDGS	**$ 0.17**	/ton
Break-Even Price for DDGS	**$ 141.65**	/ton DDGS

Value of Using 200 lb Per Ton of Golden DDGS in Swine Feed		
(~90% available lysine in DDGS)		
Ingredient Prices	**$/ton**	
Corn	$ 108.89	$ 3.05
Hi-Pro Soybean Meal	$ 320.00	
Dicalcium Phosphate, 18.5%	$ 380.00	
DDGS (Golden)	$ 140.00	
Limestone	$ 65.00	
Savings from using 200 lb DDGS	**$ 1.22**	/ton
Break-Even Price for DDGS	**$ 152.21**	/ton DDGS

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 (?)

DDGS: other factors.

In swine:

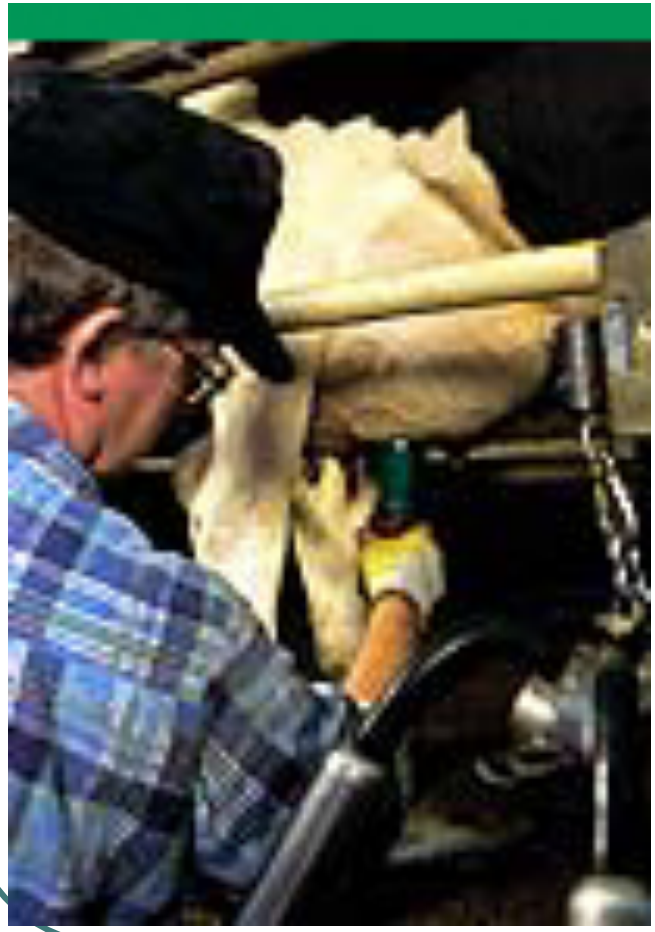
- 10% DDGS in diet in grow/ finish and up to 40% of sow gestation diets.
- See less use in nursery and lactation diets
- Many producers report a “gut health” benefit

DDGS: other factors.

In beef cattle:

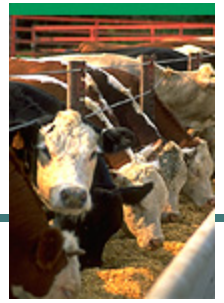
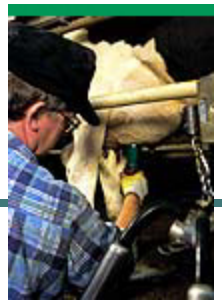
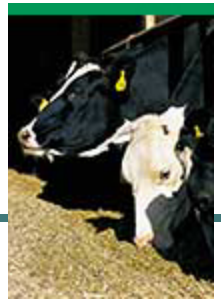
- Up to 15% DDGS in diet competes with other protein sources in value.
- Over 15% DDGS in diet competes with other energy sources in value.
- Reduces incidence of acidosis and associated problems.

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.

Thank You