

Feeding Distillers' Grains to Beef Cows



U of M Beef Cow-Calf Days 2007

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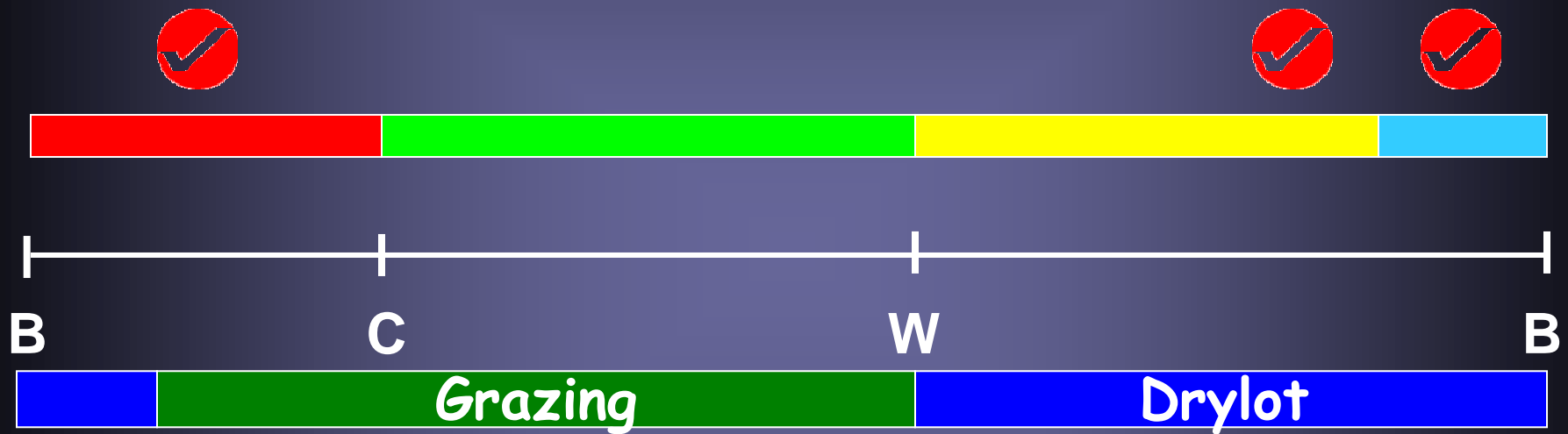
Beef Team

Critical Nutrition Needs

- Weaning to 50 days before calving
 - slow fetal growth
 - recuperate condition
- 50 days before to calving
 - rapid fetal growth
 - prepare for milk production
- Calving to 85 days of lactation
 - heavy milk production
 - recuperate for reproduction
- Last 125 days of lactation
 - moderate to low milk production

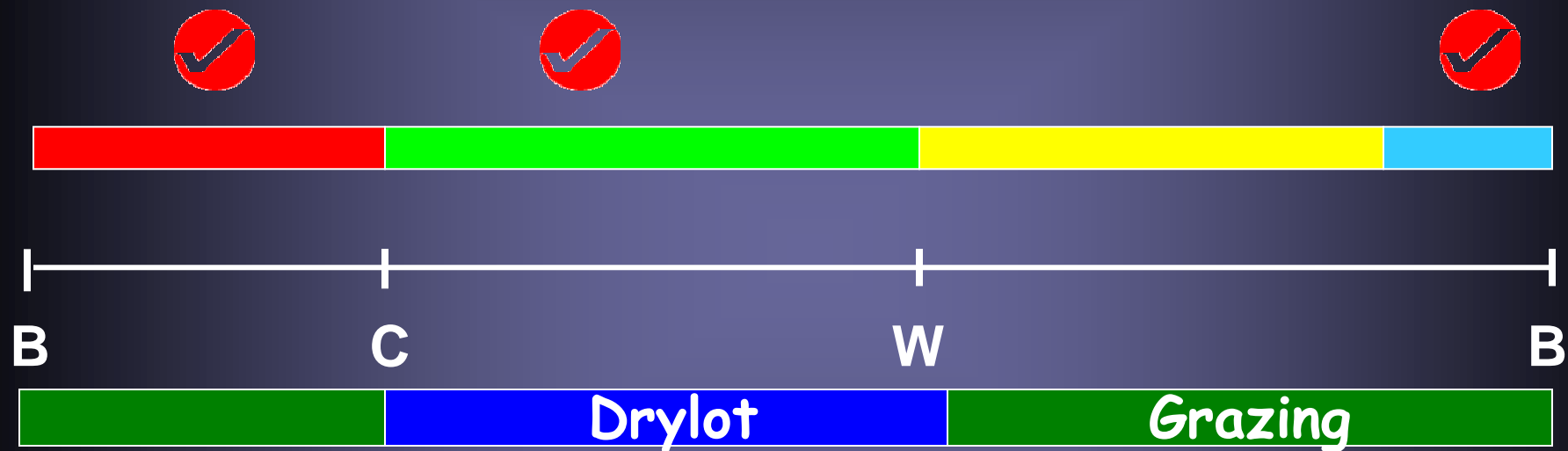


For Spring-calving



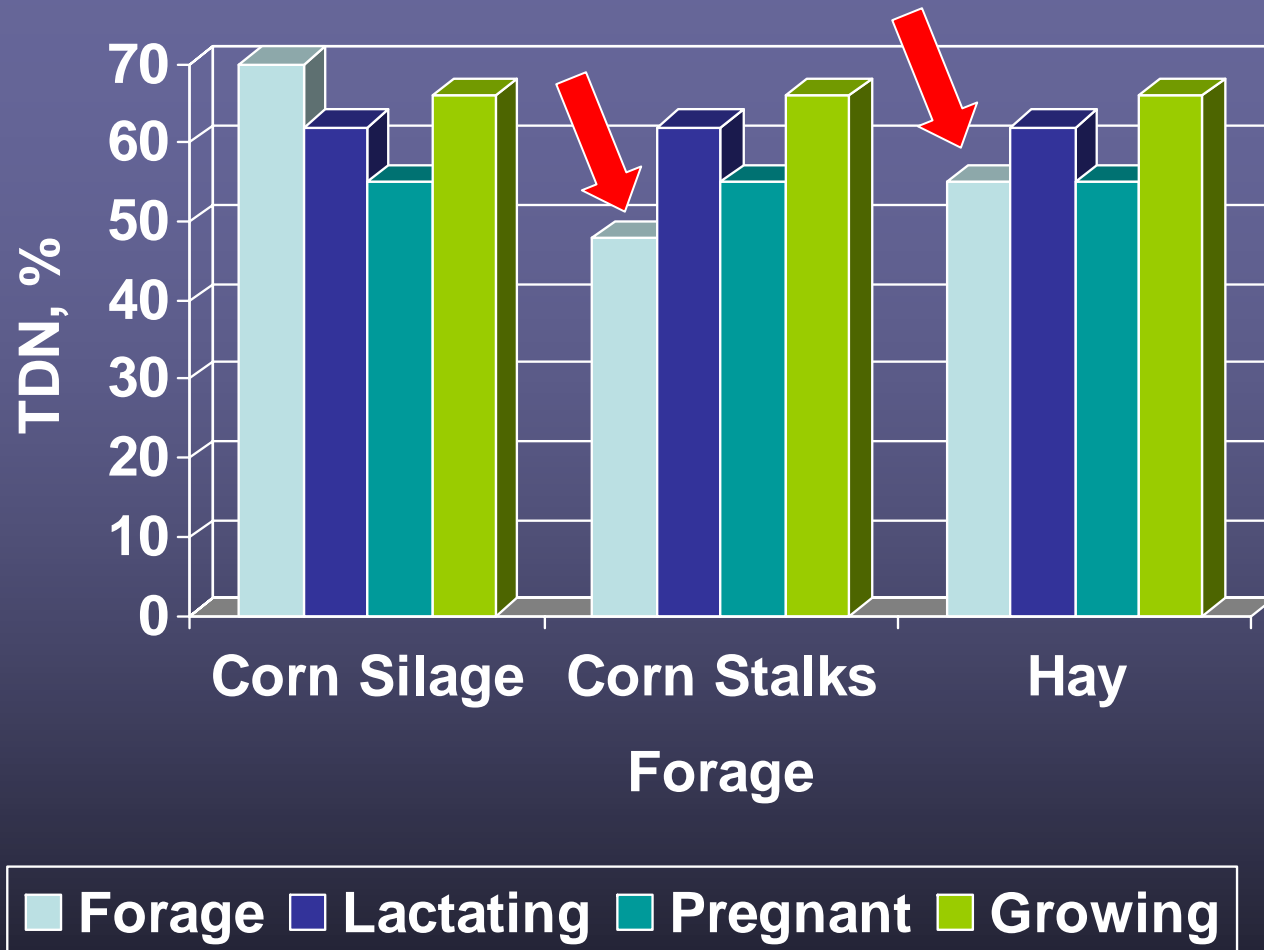
- Early lactation, highest need
- Late lactation, second highest need
- Weaned, lowest need
- 50 d before calving, third highest need

For Fall-calving



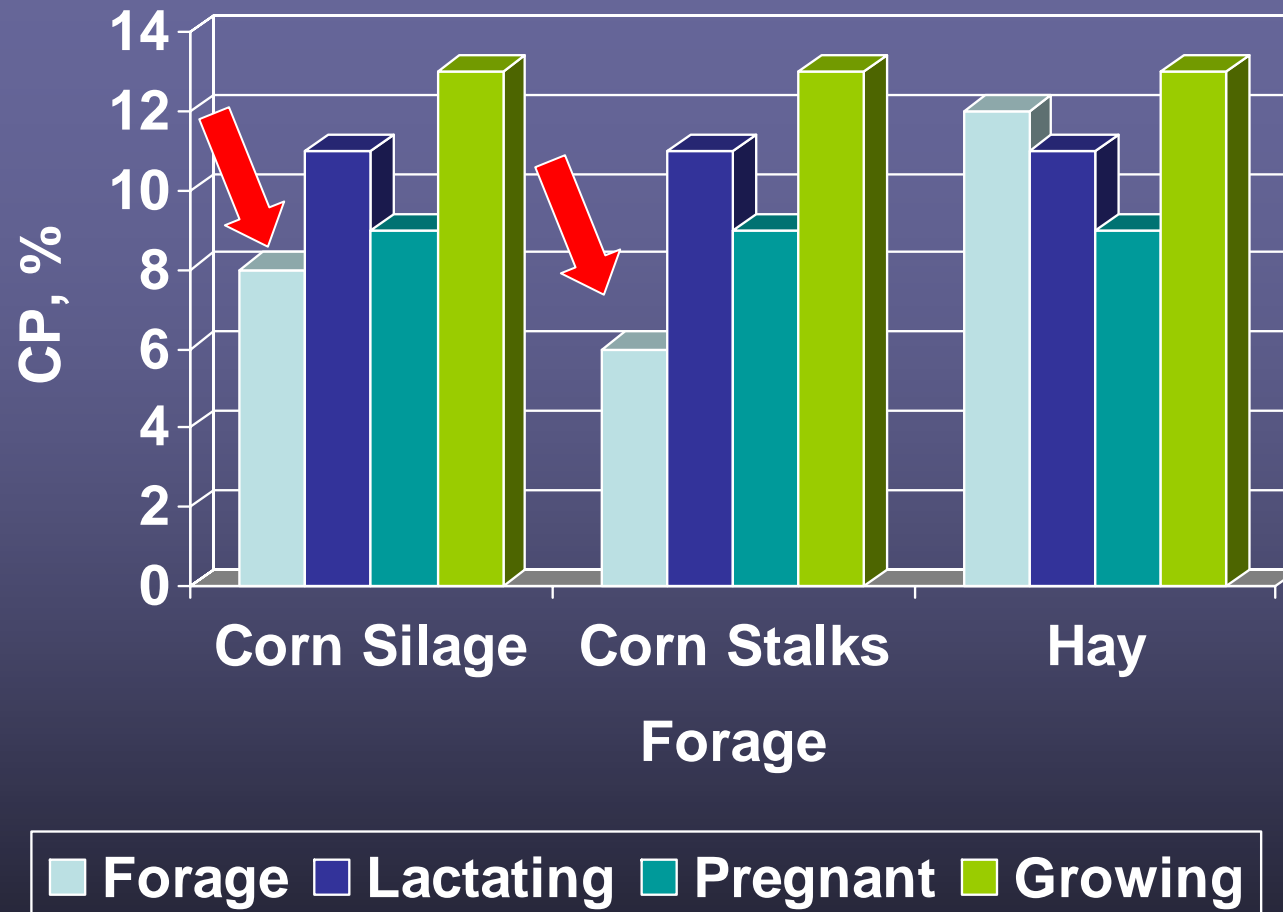
- Early lactation, highest need
- Late lactation, second highest need
- Weaned, lowest need
- 50 d before calving, third highest need

What Forages Need Energy Supplements



What classes of cattle can use low quality forages?

What Forages Need Protein Supplements



What classes of cattle require protein supplementation?

Consider Supplementing: (Spring Calvers)

- Energy on low-quality forage diets
 - corn stalks
 - hay
- Gestating diet needs:
 - 55% TDN
 - 8% CP
- Lactating diet needs:
 - 60% TDN
 - 12% CP



Consider Supplementing

(Fall Calvers)



- In drought years
 - Late-gestating cows
 - 55% TDN
 - 8% CP
- Every winter
 - Lactating cows
 - 60% TDN
 - 12% CP

A Prophetic Statement

➤ DDGS as an energy source

- “if abundant supplies of wet distillers’ grains should become available—as a result, for example, of increased production of fuel alcohol—this by-product could be used as an energy source in livestock feeds.”

NCR No. 297, 1984

- Corn is starch, fiber, protein, oil, and P

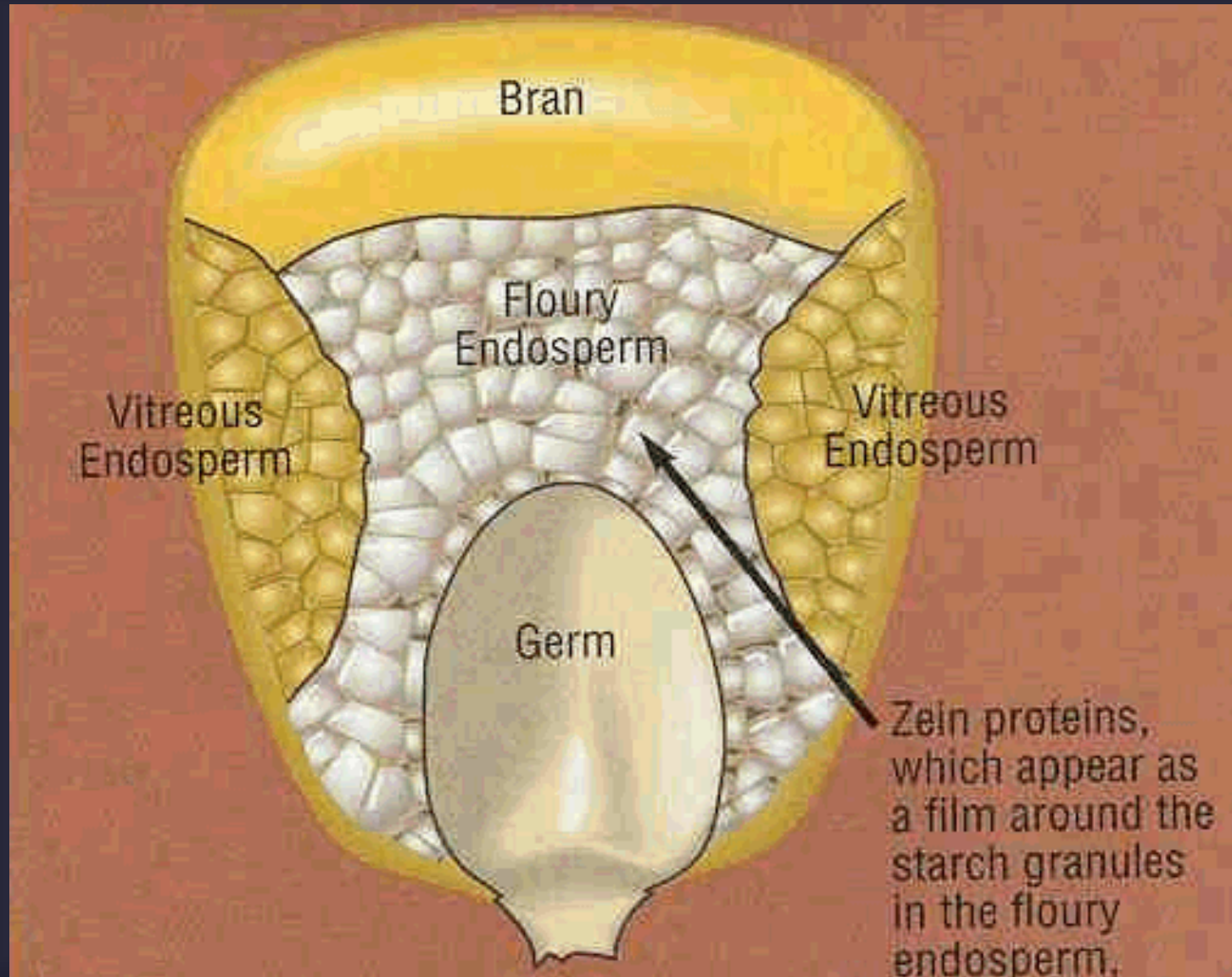
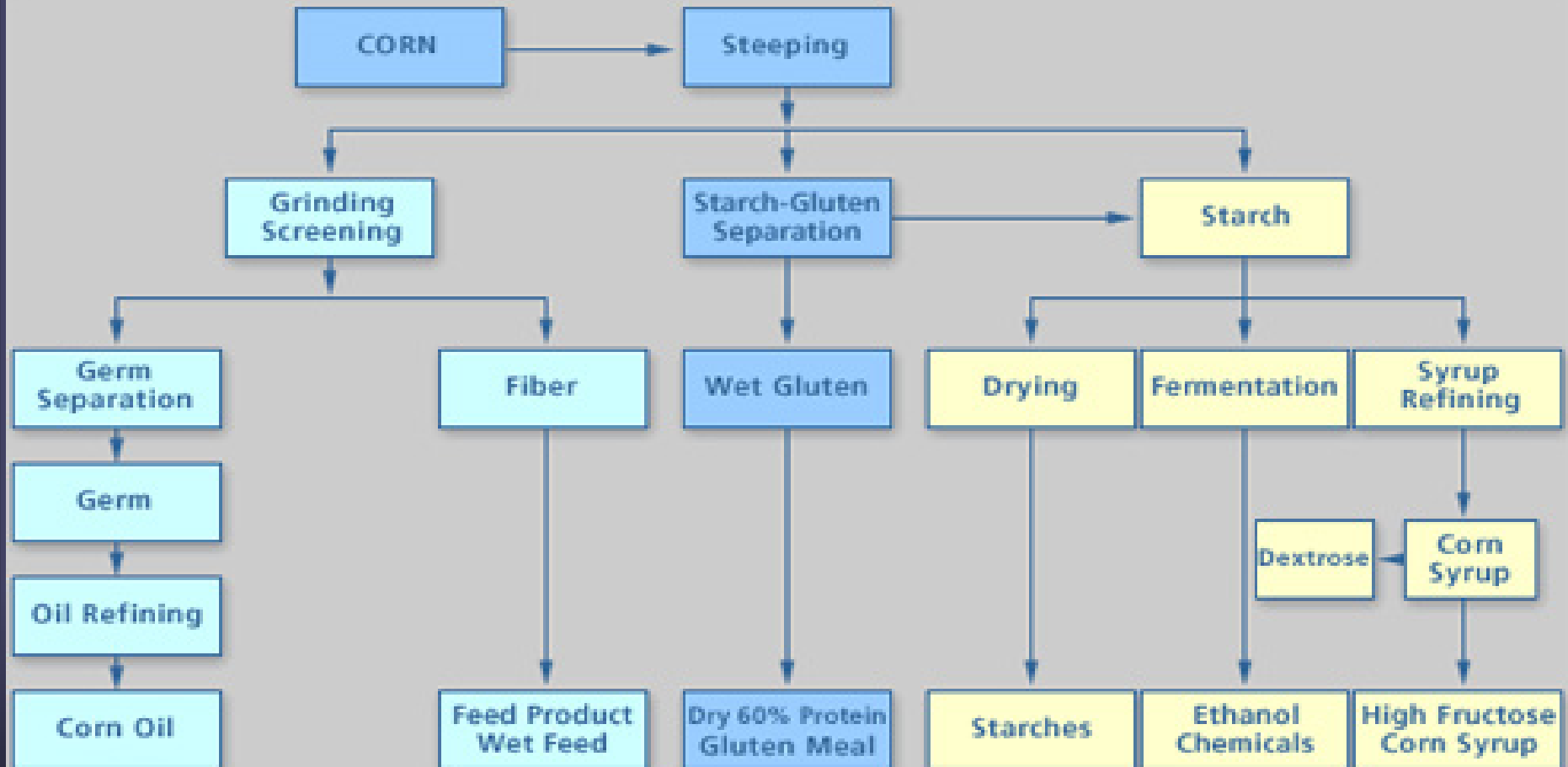


Diagram Source: Dairy Herd Management, Nov 1998.

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Wet Milling Process



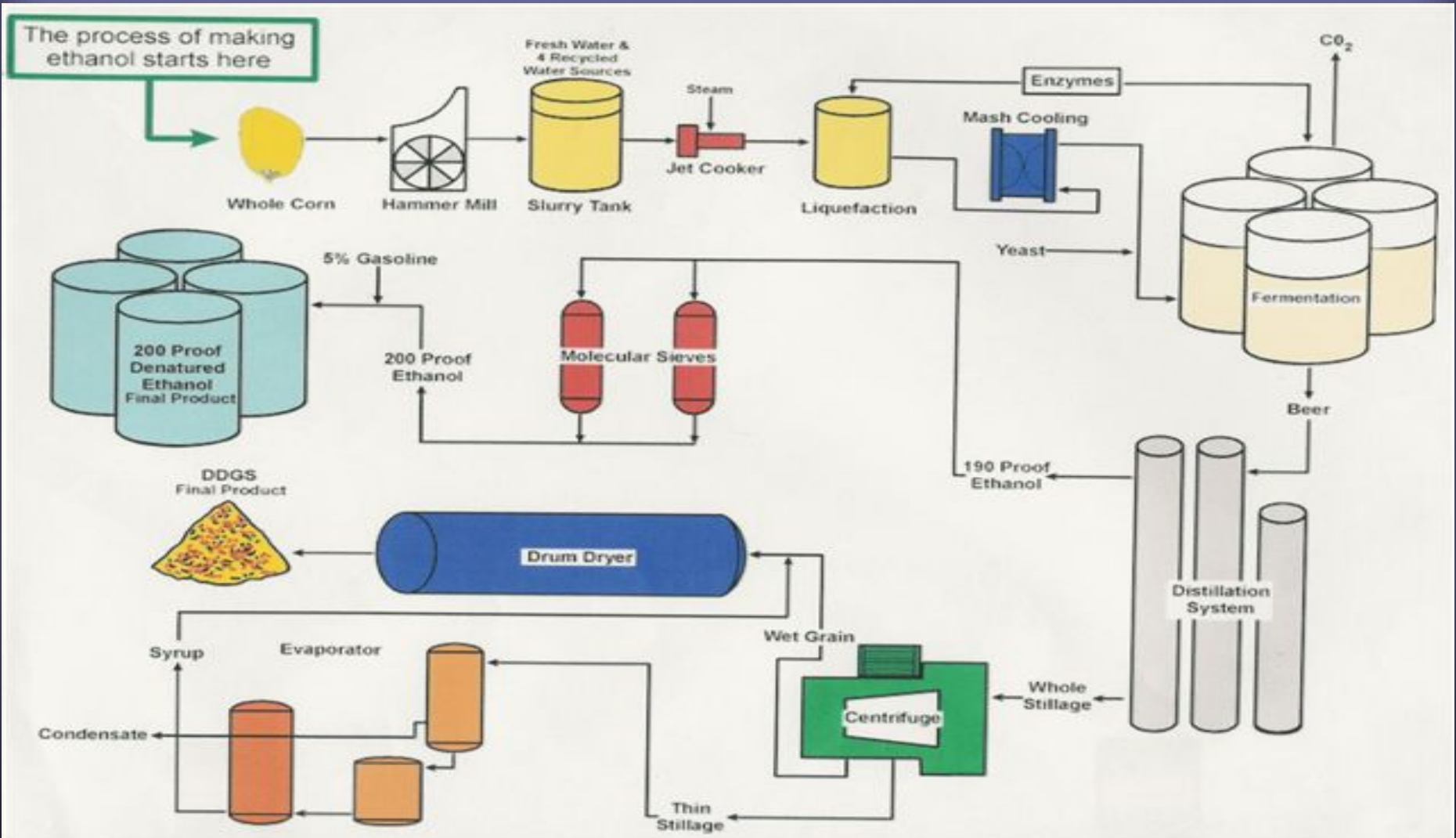
Wet corn gluten feed (WCGF) is the result of wet milling process. Most of the oil, protein and starch is removed from the co-product. WCGF is a high-fiber, moderate protein feed.

Wet Corn Gluten Feed





Dry Milling Process



Dry milling leads to production of distillers' grain (wet or dry) and condensed distillers (thin stillage). Only starch is removed, resulting in co-product containing mostly corn protein, fiber and fat. Sulfur is added to the process to manipulate fermentation, and may increase sulfur content in co-products.

Wet Distillers' Grains

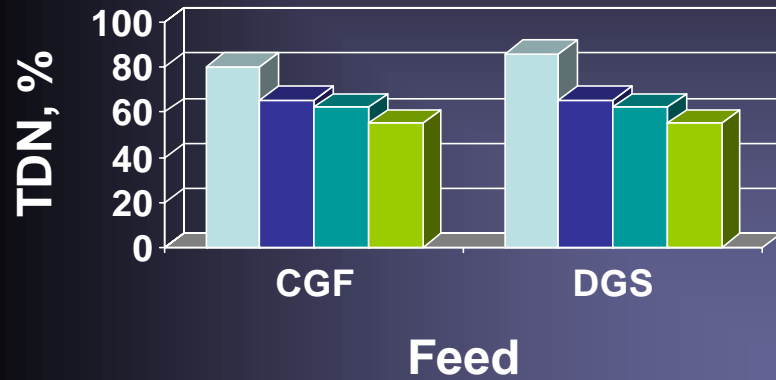


Corn Processing Co-products

Corn processing	Type	DM, %	TDN, %	CP, %	Ca, %	P, %
Condensed distillers solubles	B	26	90	24	.17	1.45
Corn	E	88	90	9	.02	.31
Corn gluten feed, dry	B	90	80	20	.04	.67
Corn gluten feed, Wet	B	45	80	18	.04	.67
Distillers grains, Dry	B	90	86	30	.02	.49
Distillers grains, Wet	B	35	126	30	.02	.49

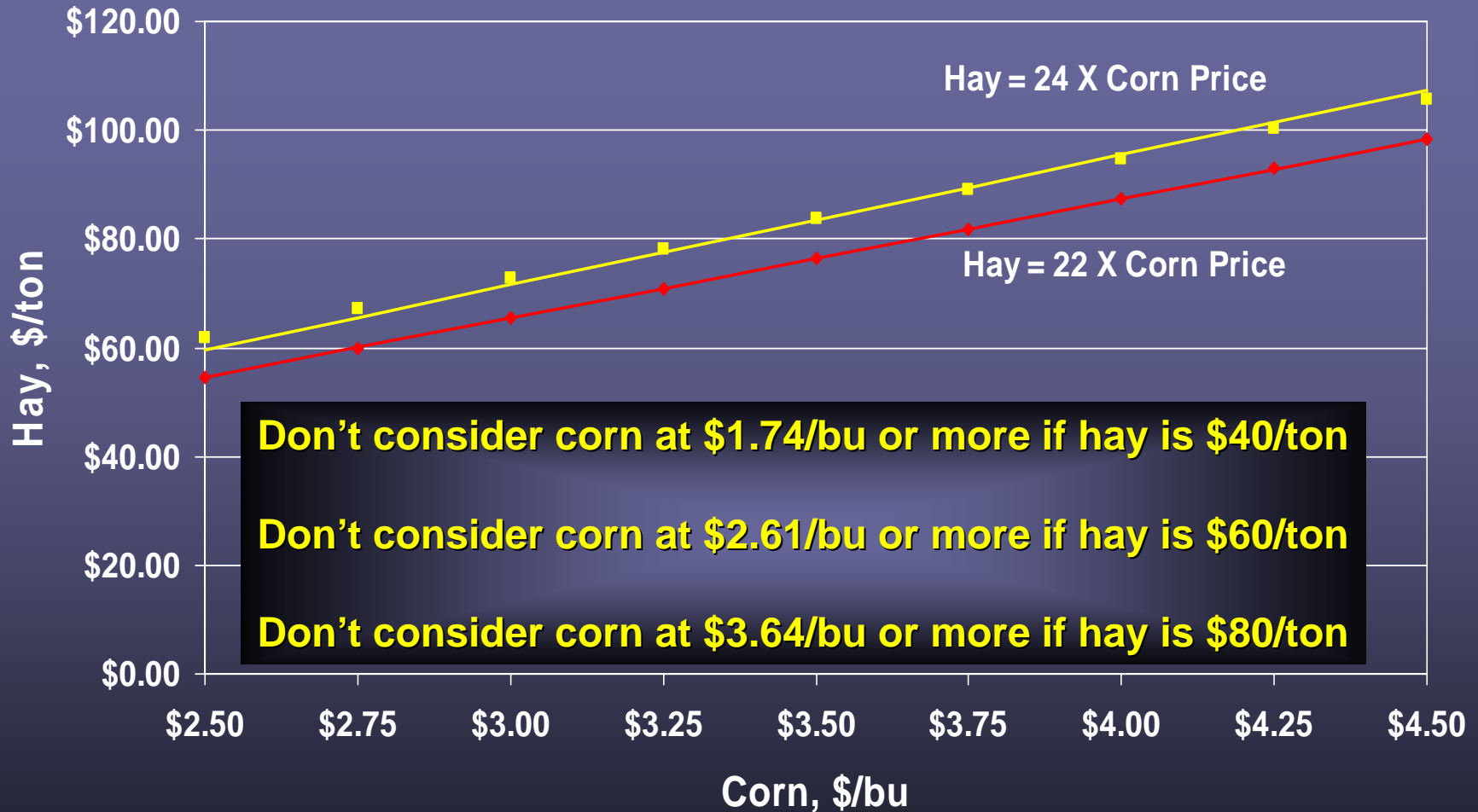
Energy Supply

■ Byproduct ■ Growing ■ Lactating ■ Dry



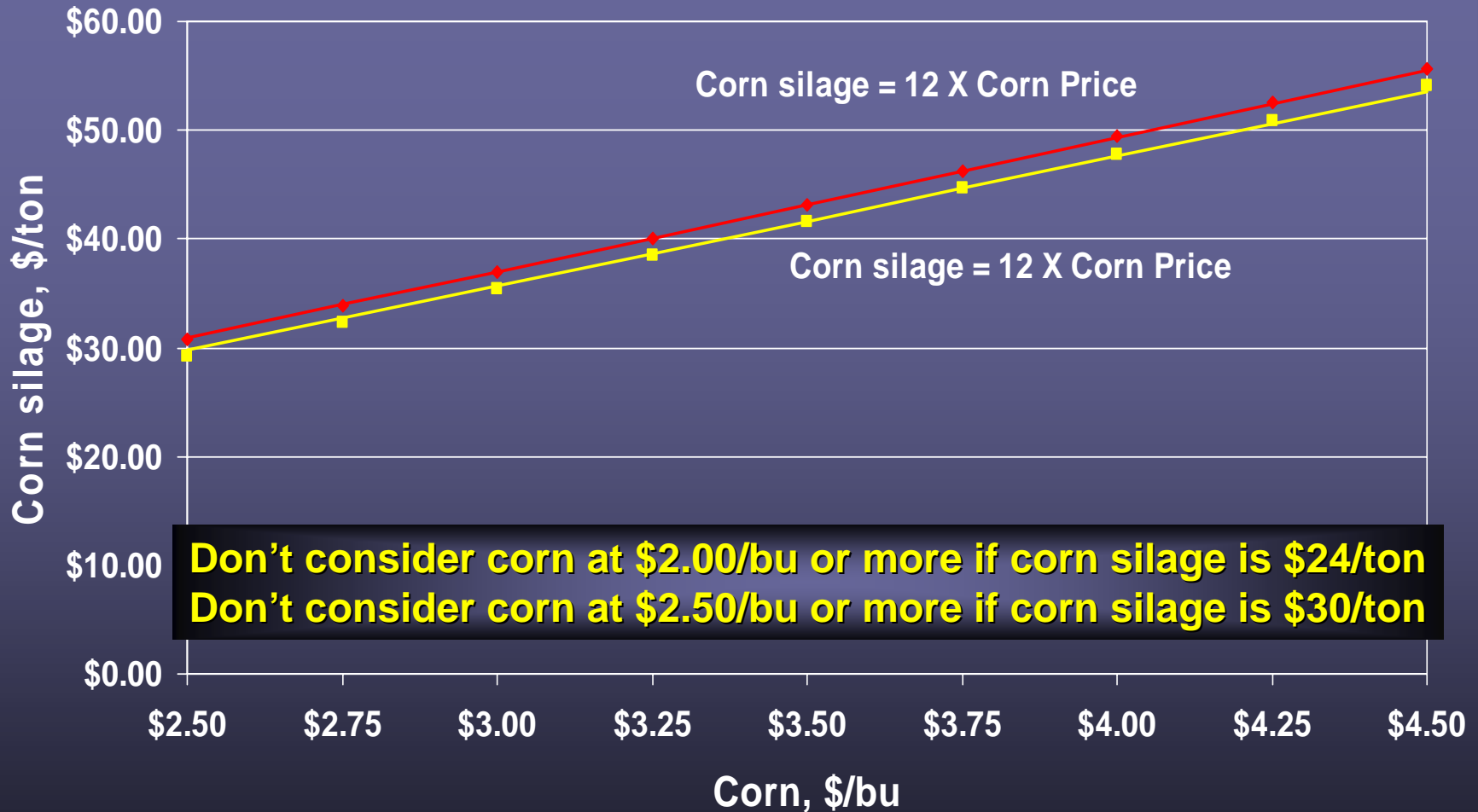
Corn gluten feed (CGF) and distillers' grains (DGS) contain more energy and protein than needed by growing or lactating beef cattle

What Price to Pay for Corn on Hay-based Diets? (88% DM, 55% TDN, 14% CP)



◆ @ 8% CP ■ @ 12% CP — Linear (@ 8% CP) — Linear (@ 12% CP)

Corn and Corn Silage Price Relation



◆ @ 8% CP ■ @ 12% CP — Linear (@ 8% CP) — Linear (@ 12% CP)

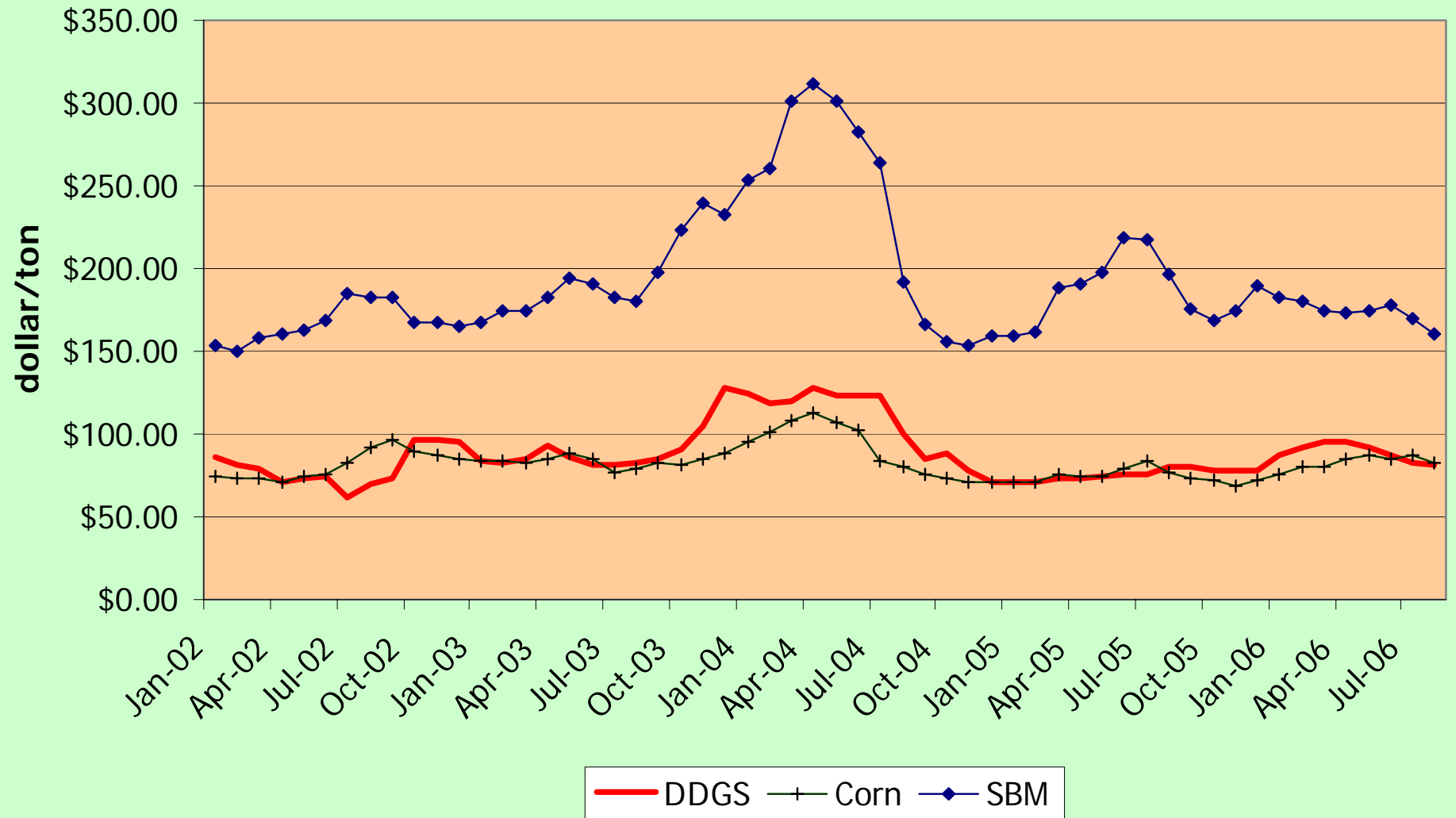
How Much Can We Pay for Dry Distillers' Grains?



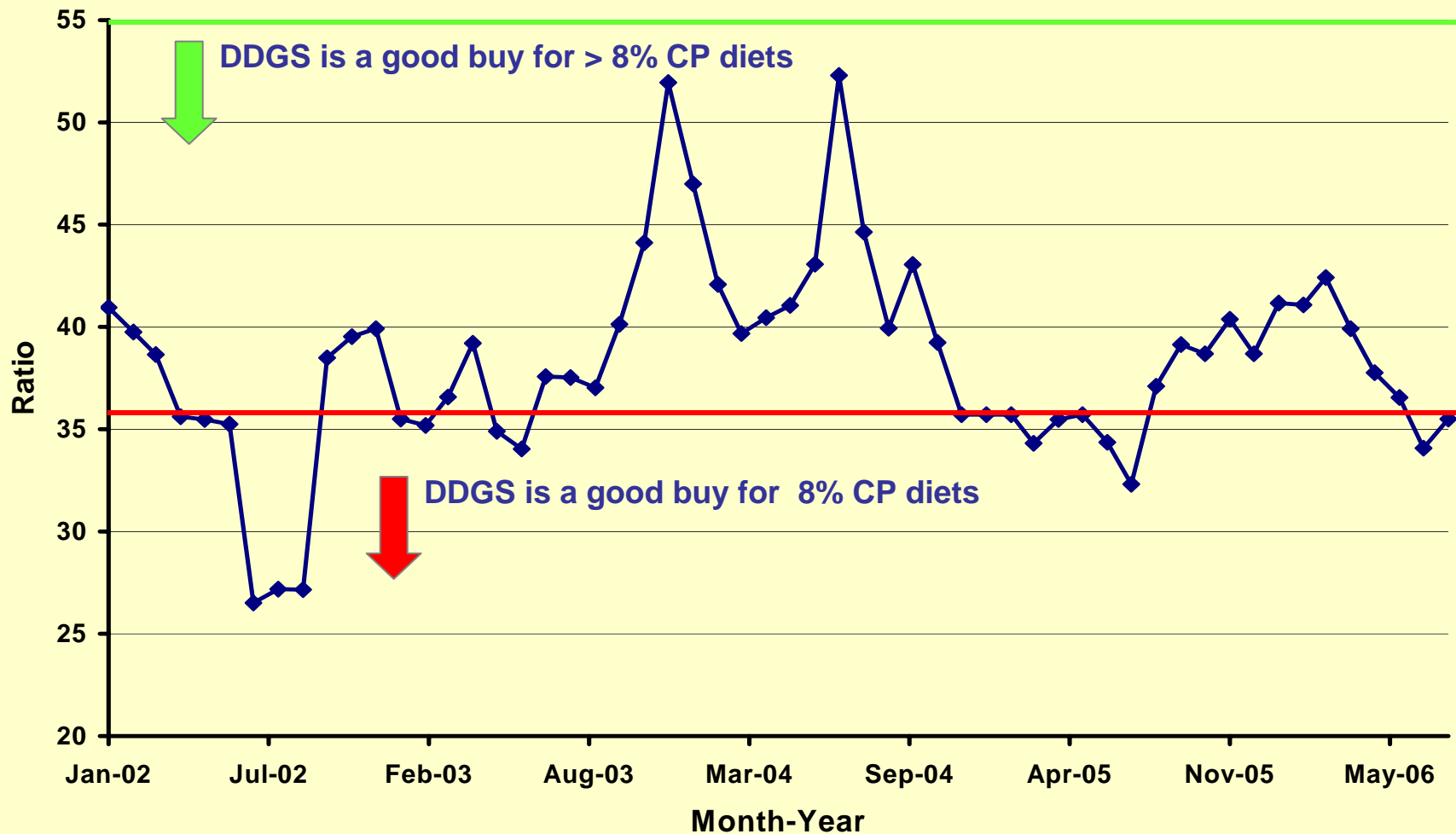
◆ @ 8% CP ■ @ 12% CP ▲ 2007 — Linear (@ 8% CP) — Linear (@ 12% CP)

Opportunity prices for DDGS were generated when corn prices varied (\$2.50 - \$4.50/bu), and relationships between opportunity and corn price were plotted by lines with no intercept to give an estimate of price of DDGS:corn price. This is a factor producers can utilize to price DDGS based on corn price. Thus, when corn grain is \$3.62 and we wish to compare to DDGS, the price of DDGS (when ignoring protein content) is 36 or \$130.32/ton. So far in 2007, Feedstuffs has reported Minneapolis cash prices for corn and DDGS, which are plotted in green triangles. These values reflect that price of DDGS relative to corn is favorable for the current year, particularly if we are formulating for higher protein diets (lactating and growing cattle).

DDGS, Corn and SBM Prices



Ratio of DDGS and Corn Price



Data from the previous slide were transformed to the ratio of DDGS price:corn price so that we can evaluate whether this ratio was favorable for purchasing DDGS over corn during the time plotted. During July 2002, February 2003, late spring 2003, spring to summer 2005, and summer 2006, price of DDGS was better than price of corn (consider that corn prices during that time were also low). During all months plotted DDGS was a better buy than corn for high-protein diets.

How Much Can We Pay for Wet Distillers' Grains?



◆ @ 8% CP ■ @ 12% CP — Linear (@ 8% CP) — Linear (@ 12% CP)

Wet distillers' grains (WDGS) are good purchases when the price of WDGS is no more than 13 (low protein) or no more than 19 (high-protein) times the price of corn. Prior to and right during harvest, many wet distillers grains contracts and prices averaged \$30/ton. Therefore, WDGS is a very attractive option.

Price Should Reflect Freight, Storage, Wastage

- **Freight costs**

- \$3.00/loaded mile
- 22 ton/load
 - 20 miles = \$2.73/ton
 - 40 miles = \$5.45/ton
 - 60 miles = \$8.18/ton

- **Storage costs**

- At 100 ft, an 8-ft Ø bag:
 - 54,900 lb DM
 - 183,000 lb WDGS
 - 92 ton WDGS
- Cost: \$4.00/ft or \$400
- \$400/92 ton = \$4.34/ton

- **Wastage**

- From 10% to 30%

- **Actual cost**

- FOB plant = \$30/ton
- Freight, 40 miles = \$5.45/ton
- Storage = \$4.34/ton
- Wastage = 10% of sub-total
- Sub-total = \$39.79
- Wastage = \$3.98/ton
- Total = \$43.77/ton

- **Compare with breakeven cost:**

- \$43.77/ton vs \$47.06/ton (\$3.62 X 13)



add another \$10 to \$15/ton

Bagged Wet Distillers' Grains (WDGS)

(Univ. of Nebraska)

At pressures required to bag wet materials, WDGS bags rip unless some dry forage is added.



WDGS no forage added

WDGS and 7.5% or 10%
grass hay (DM basis), added
*Bags with hay added at above levels
still ripped within 24 h of bagging.*



Bagged WDGS
(KSU; pressure released)
Lowers storage capacity



Bagged WDGS

(Univ. of Nebraska)



WDGS and 15% grass hay (DM basis)
WDGS and 12.5% wheat straw (DM basis)

Bagged Modified WDGS

(Univ. of Nebraska)



WDGS in a Bunker Silo

(Univ. of Nebraska)

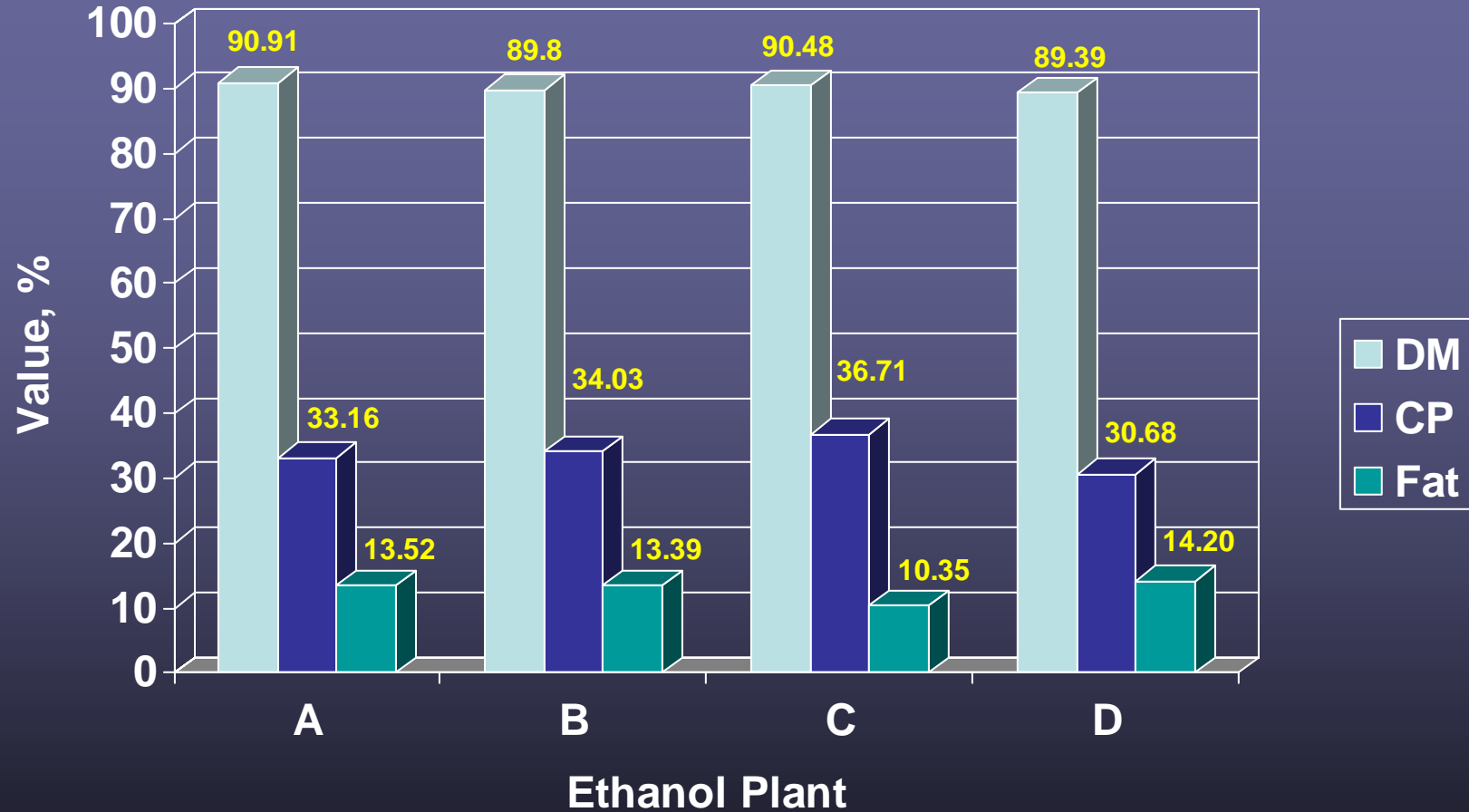


WDGS and 40% grass hay (DM basis)

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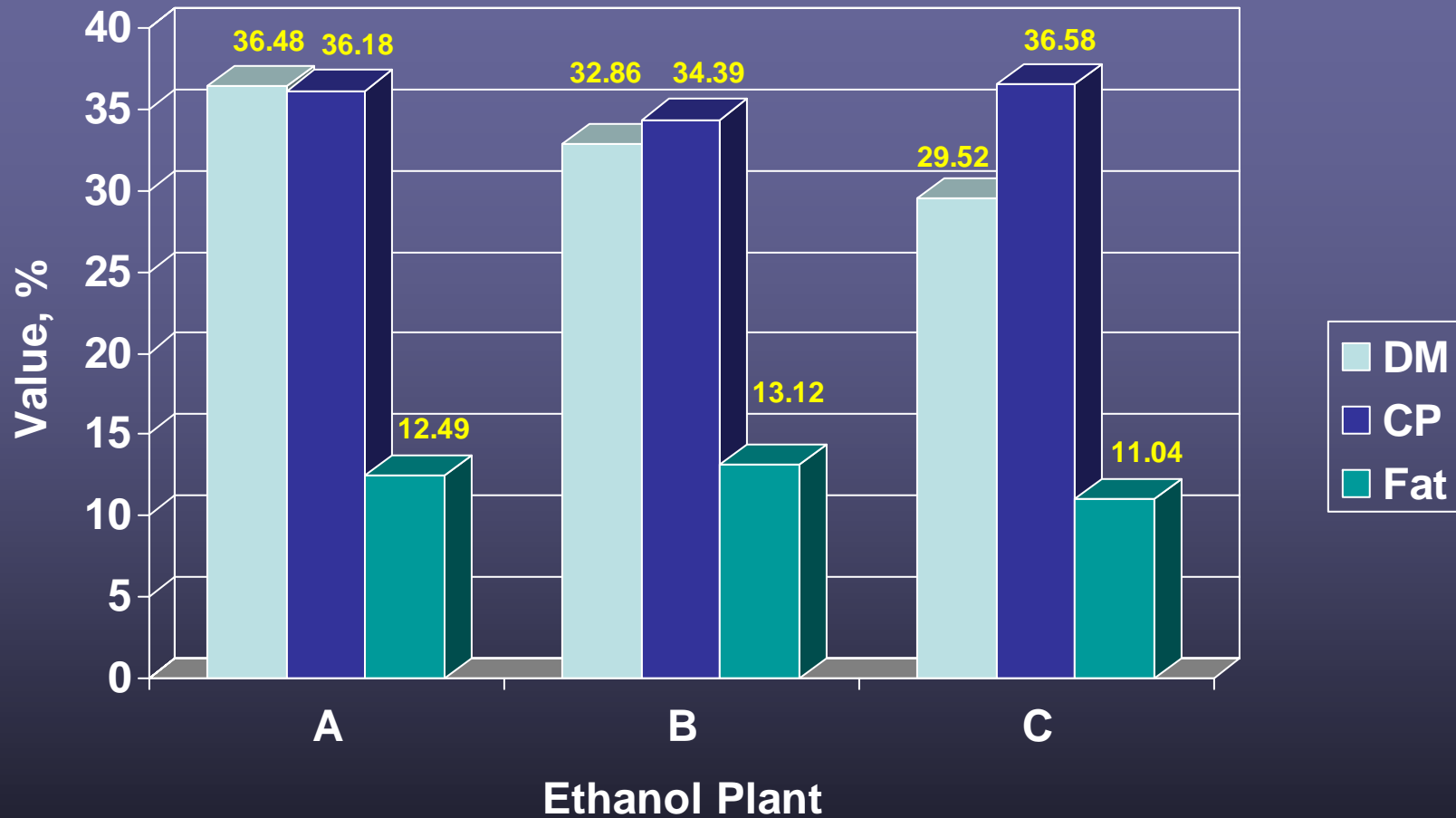
Variation in DDGS

(Holt and Pritchard, 2004)



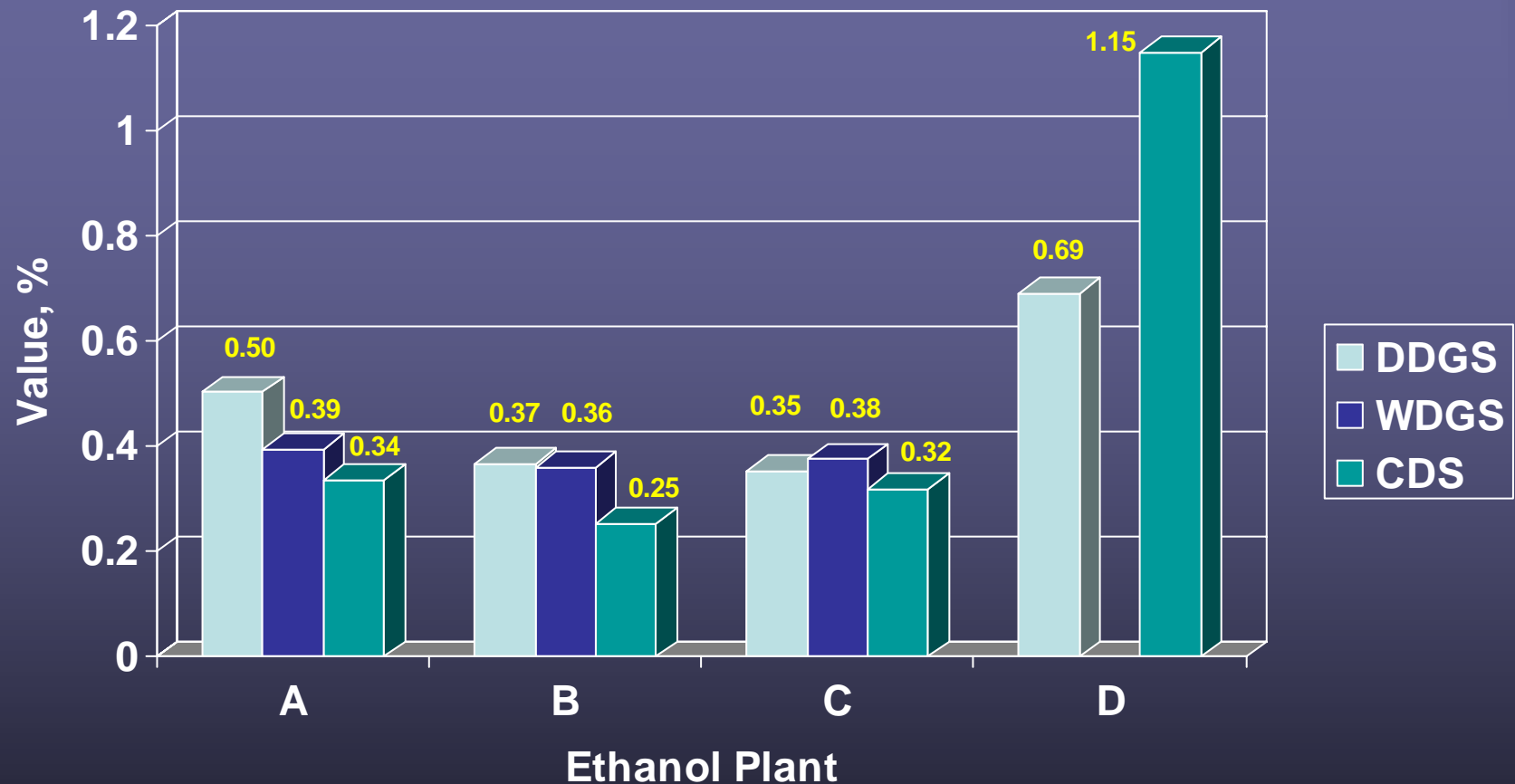
Variation in WDGS

(Holt and Pritchard, 2004)



Variation in Sulfur Content

(Holt and Pritchard, 2004)



The NRC recommends no more than 0.4% S in diets of beef cattle. Because these values varied by plant, it is important for producers to obtain a sample, and monitor S in their supply of DGS.

Example Rations (DDGS)

Using corn at \$3.62, and DGS at opportunity prices derived from ratios obtained (55 for lactating and growing diets and 36 for dry cow diets), DGS worked well into these example rations

- **Lactating cow**

- Hay 23 lb
- DDGS 7 lb

- **Dry cow**

- Hay 18 lb
- DDGS 7 lb

- **Growing heifer**

- Hay 16 lb
- Corn 4 lb
- DDGS 6 lb

- **Lactating cow**

- Corn silage 44 lb
- DDGS 5 lb

- **Growing heifer**

- Corn silage 48 lb
- DDGS 3 lb

Example Rations (WDGS)

Using corn at \$3.62, and DGS at opportunity prices derived from ratios obtained (55 for lactating and growing diets and 36 for dry cow diets), DGS worked well into these example rations

- **Lactating cow**

- Hay 21 lb
- WDGS 22 lb

- **Lactating cow**

- Corn silage 41 lb
- WDGS 16 lb

- **Dry cow**

- Hay 16 lb
- WDGS 21 lb

- **Growing heifer**

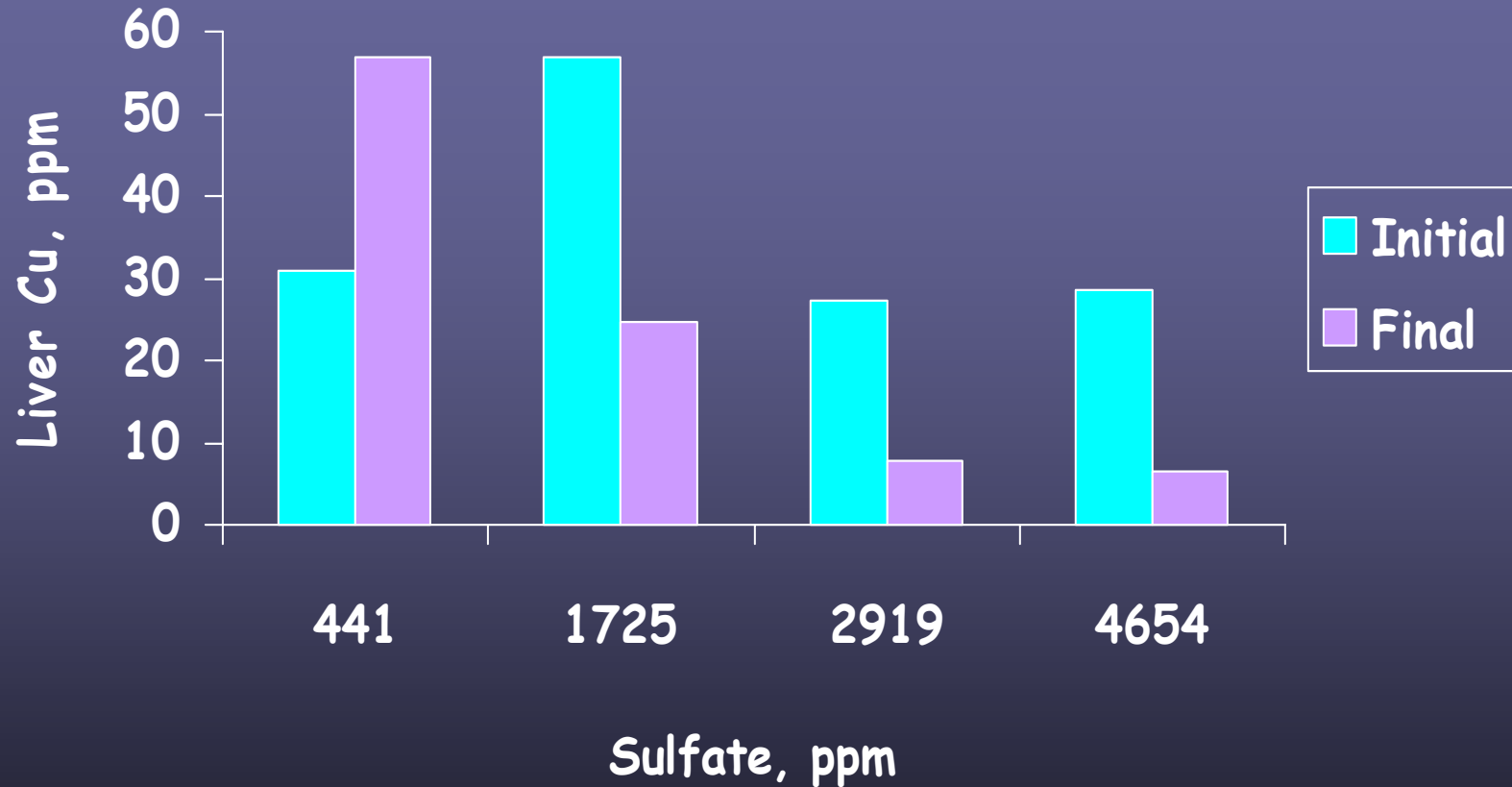
- Corn silage 49 lb
- WDGS 7 lb

- **Growing heifer**

- Hay 18 lb
- WDGS 24 lb

Effects of Sulfate in Water Source

(Wright and Patterson, 2005)



Final Cu: 441 ppm < others (P < 0.05).

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Correlation between Total Dissolved Solids and Sulfate > 0.83

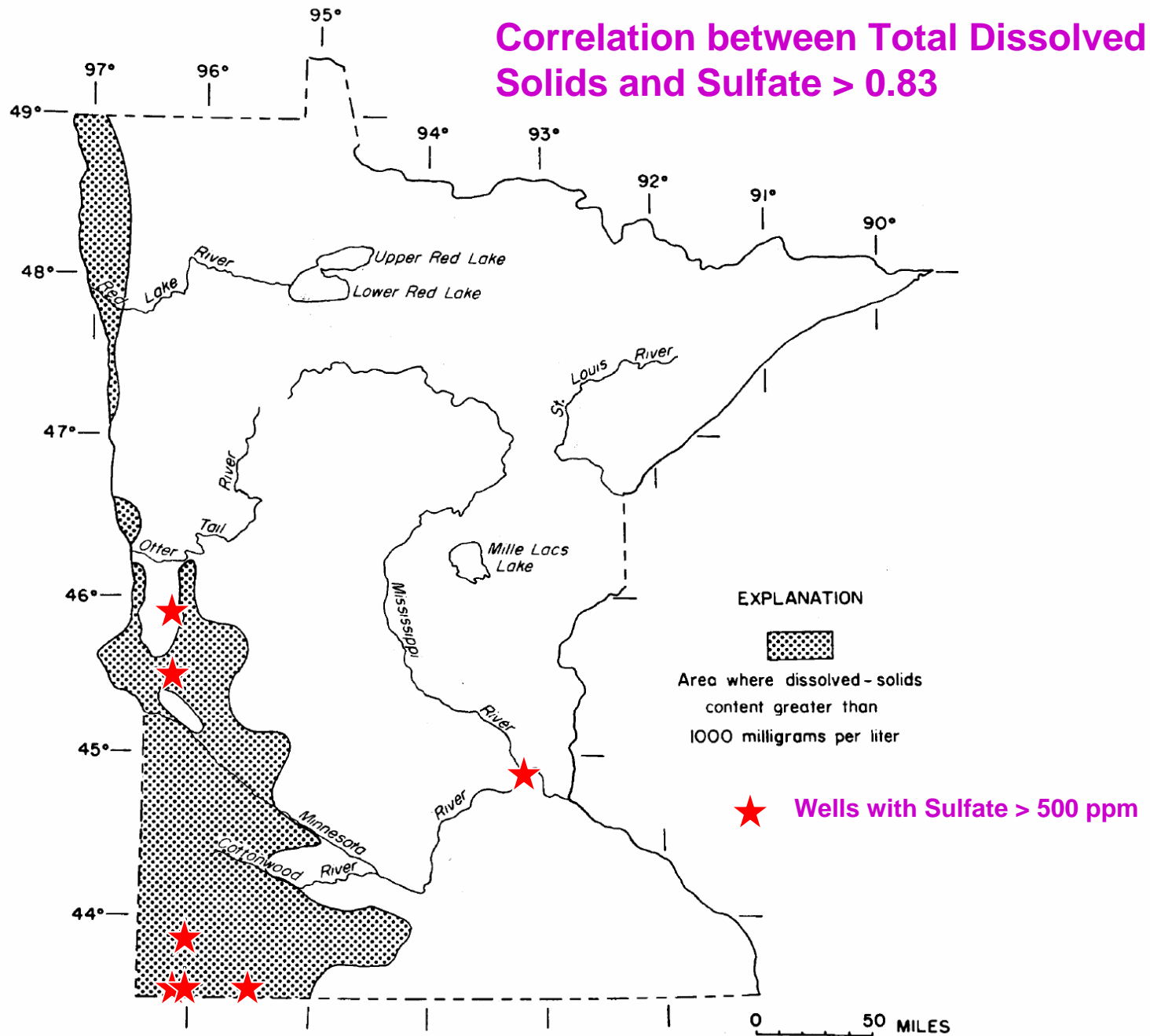
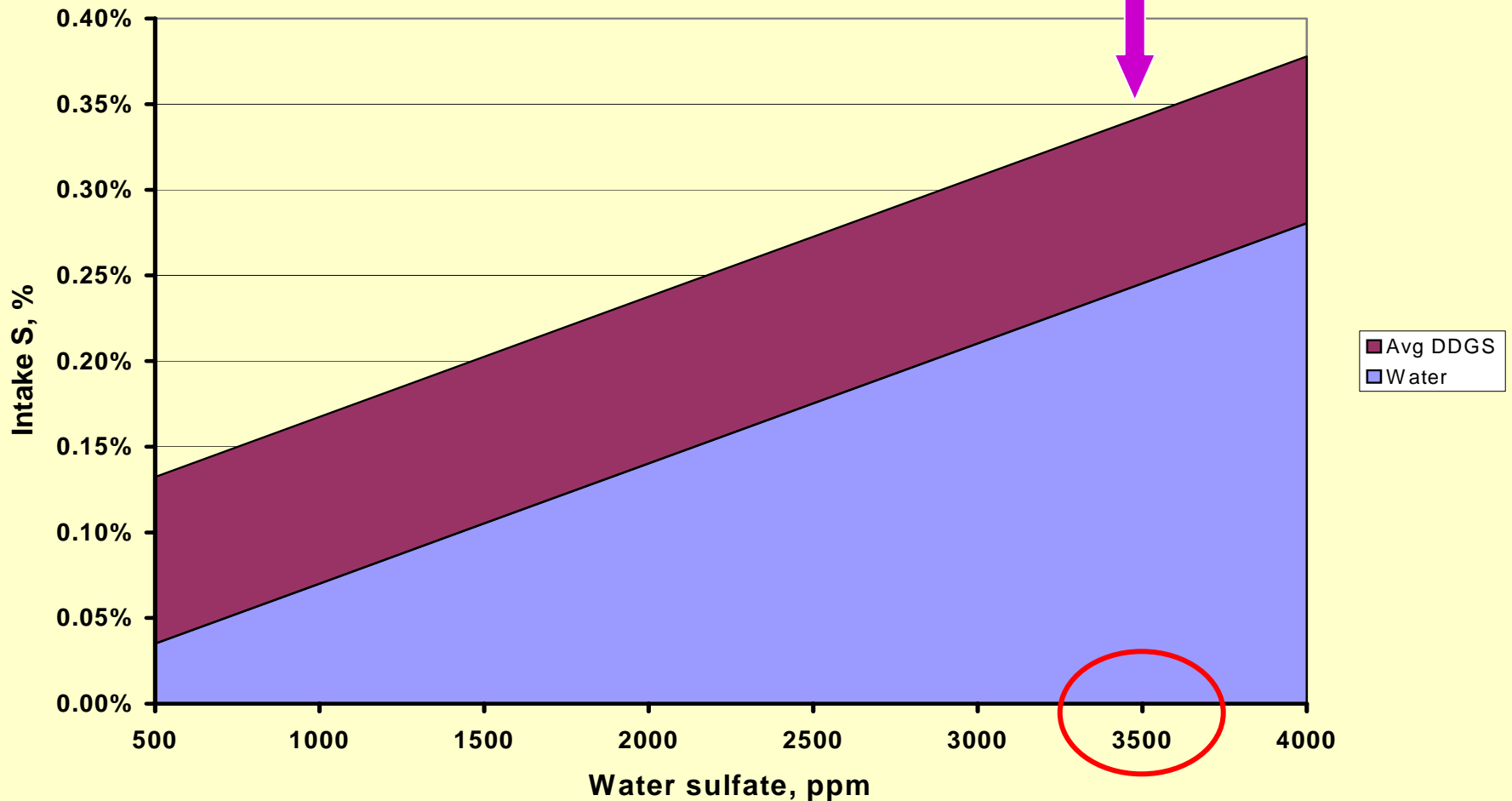


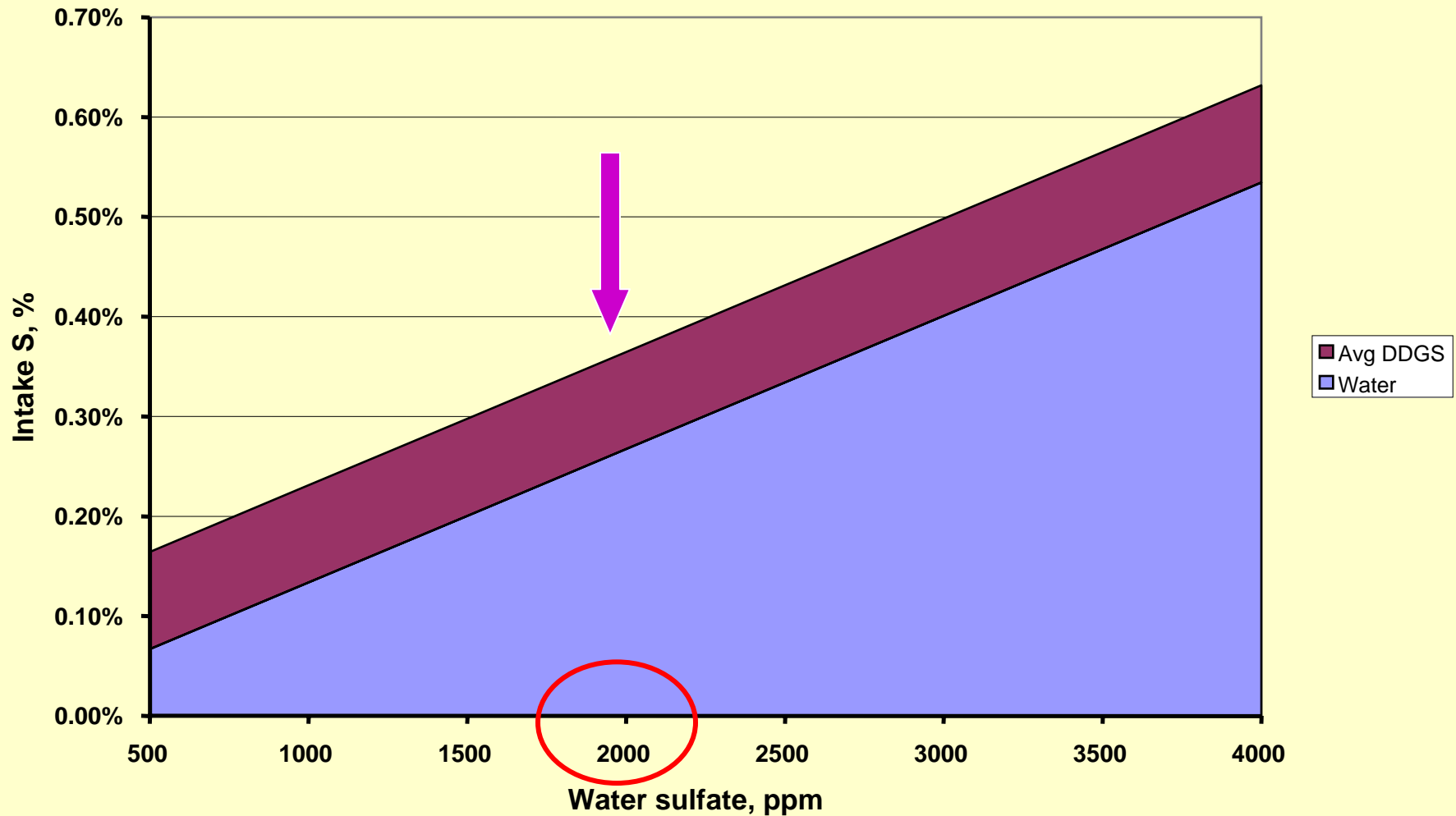
Figure 7.--Areas of highly mineralized ground water.

Distillers' and Water Sulfur in Dry Cows



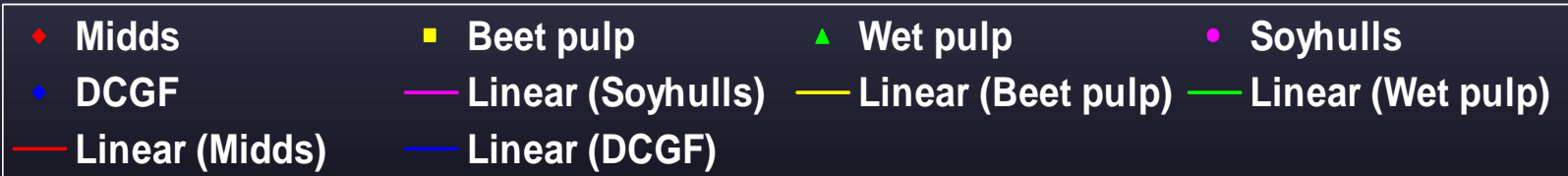
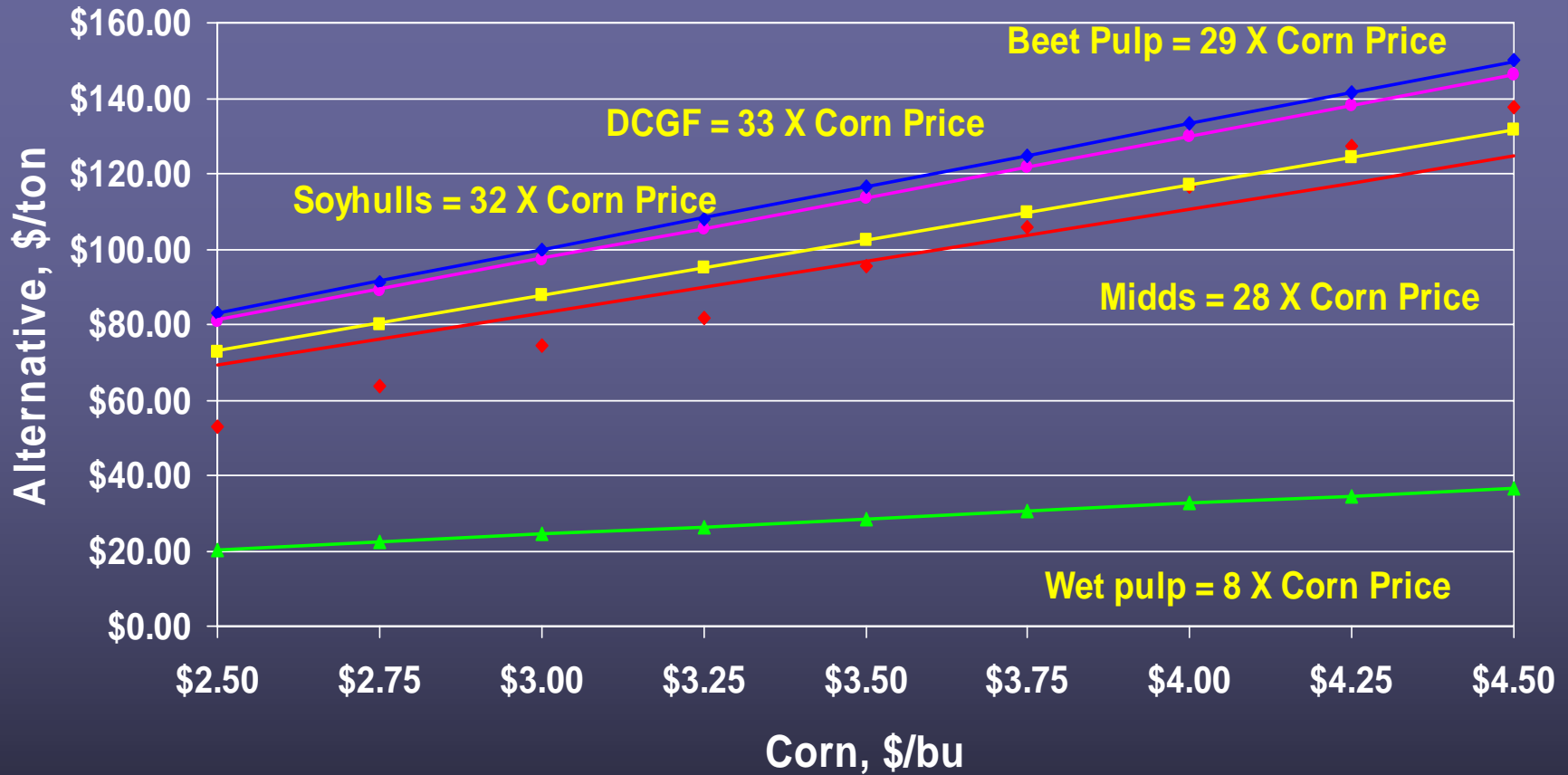
An attempt was made to generate water sulfate levels at which supplementation with 6 lb DM DGS (0.43% S), and with cows consuming 7 gal water. The graph reveals DGS and water S, and demonstrates that based on these two (not considering other S sources), water sulfate levels can be fairly high (this value is not recommended because it may cause S toxicity in growing or lactating cattle).

Distillers' and Water Sulfur in Lactating Cows



Similarly, a graph for a lactating cow consuming 6 lb DGS DM (0.43% S) and 12.6 gal water with varying amounts of sulfate. At 2,000 ppm water sulfate, S intake in this example would reflect a concentration of 0.35% of the diet DM. Therefore, in growing or lactating cattle, wells with sulfate concentration of 2,000 ppm may be of concern when considering DGS.

How Much Can We Pay for Other Feeds?



Prices and Ratios

(Corn @ \$3.62/bu; 2/5/2007)



Dry distillers' grains



Dry corn gluten feed



Wheat midds

Factor Values

Minneapolis Selling Price - Good Buys

Minneapolis Selling Price - Bad Buy



Soybean hulls



Beet pulp

Summary

- **At current prices, corn grain is not an alternative:**
 - in low-cost forage systems
 - for gestating cow diets (low protein)
- **High-energy, high-protein feeds price well in lactating and growing cattle diets:**
 - dry or wet distillers' grains
- **However, there are other alternatives:**
 - corn gluten feed
 - wheat midds
 - soyhulls
 - beet pulp

Use the Following Factors to Price Alternative Feeds

- Corn
- Dry distillers' grains
- Wet distillers' grains
- Dry corn gluten feed
- Wet corn gluten feed
- Wheat midds
- Soyhulls
- Dry beet pulp
- Wet beet pulp
- Base as \$/bu
- 36
- 13
- 33
- 17
- 28
- 32
- 29
- 8

Summary

- Distillers' grains track grain prices
- Excess supply in summer and fall lead to attractive distillers' grains pricing for contracting
- Storage, shrink and wastage must be managed
- Approximately 5 to 7 lb dry distillers' grains (or wet distillers' equivalent) needed to balance corn silage and hay diets
- At 6 lb DM, dry distillers' grains can interact with sulfate concentrations and lead to intake of toxic levels of sulfate
- Make sure water sulfate concentrations are less than 2,000 ppm when using distillers' grains

A winter landscape with snow on the ground and bare trees in the background. The sun is shining brightly in the upper left corner, creating a lens flare effect. The text "Thank You!" is overlaid in the center of the image in a colorful, stylized font. The background features a line of evergreen trees and several bare deciduous trees. The foreground is filled with snow and some dry, brown grasses.

Thank You!