

Value Maximization from Corn Fractionation



Integration of Agricultural
and Energy Systems

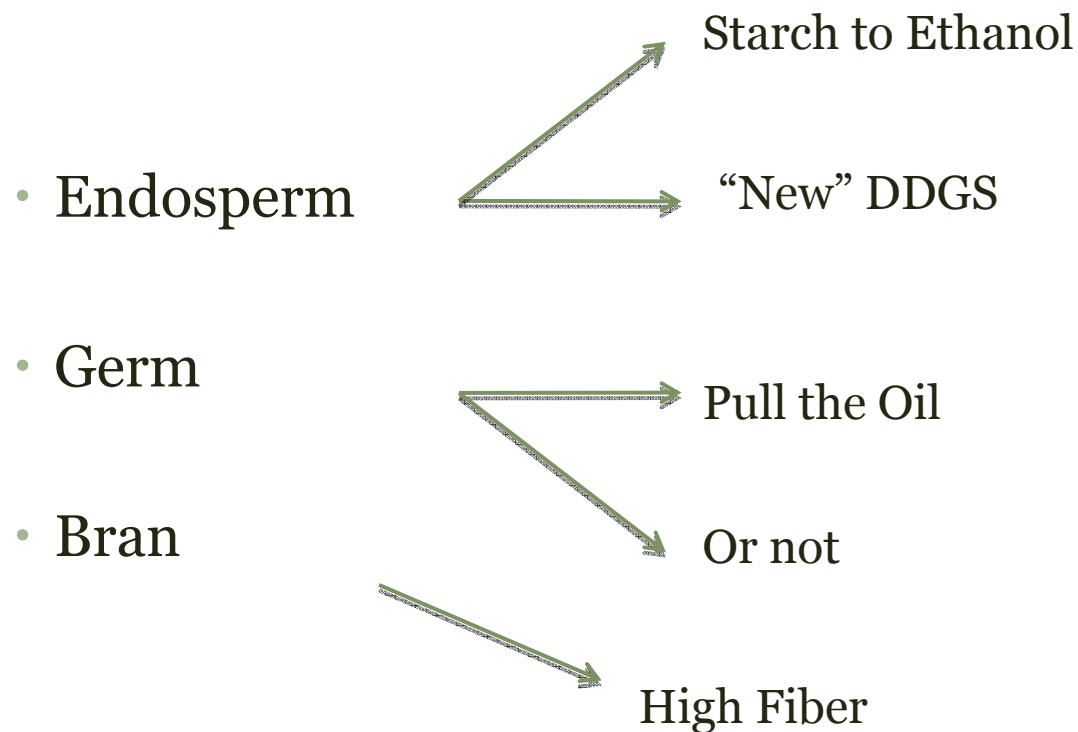
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Fractionation: Jimmy Crack Corn ...

- What do you get when you crack it first?



Fractionation: Jimmy Crack Corn...

	High Protein Meal (Endosperm)	Germ	Bran	DDGS* (conventional)
NE_{cattle}	1.68 Mcal/lb	1.73 Mcal/lb	1.41 Mcal/lb	1.67 Mcal/lb
ME_{swine}	1.842 Mcal/lb	1.727 Mcal/lb	1.293 Mcal/lb	1.72 Mcal/lb
Protein	45%	15.06%	5.41%	30%
Lysine	1.27%	0.75%	0.23%	0.91%
Nutrient Values From: Renew Energy - Jefferson, WI *Gerald Shurson http://www.ddgs.umn.edu/				

Fractionation: Jimmy Crack Corn...

- Why Crack It? ~ Livestock Producers
 - Livestock producers value coproducts for ability to substitute for corn and soybean meal in rations
 - DDGS max inclusion recommendations $\leq 20\%$
Hogs, Dairy, Poultry

Fractionation: Jimmy Crack Corn...

- 17,000,000 market hogs in Iowa on Dec 1
 - Why are they in IA ~ Cheap Corn
- Fractionated Products May be Better Suited as Hog Feed than DDGS

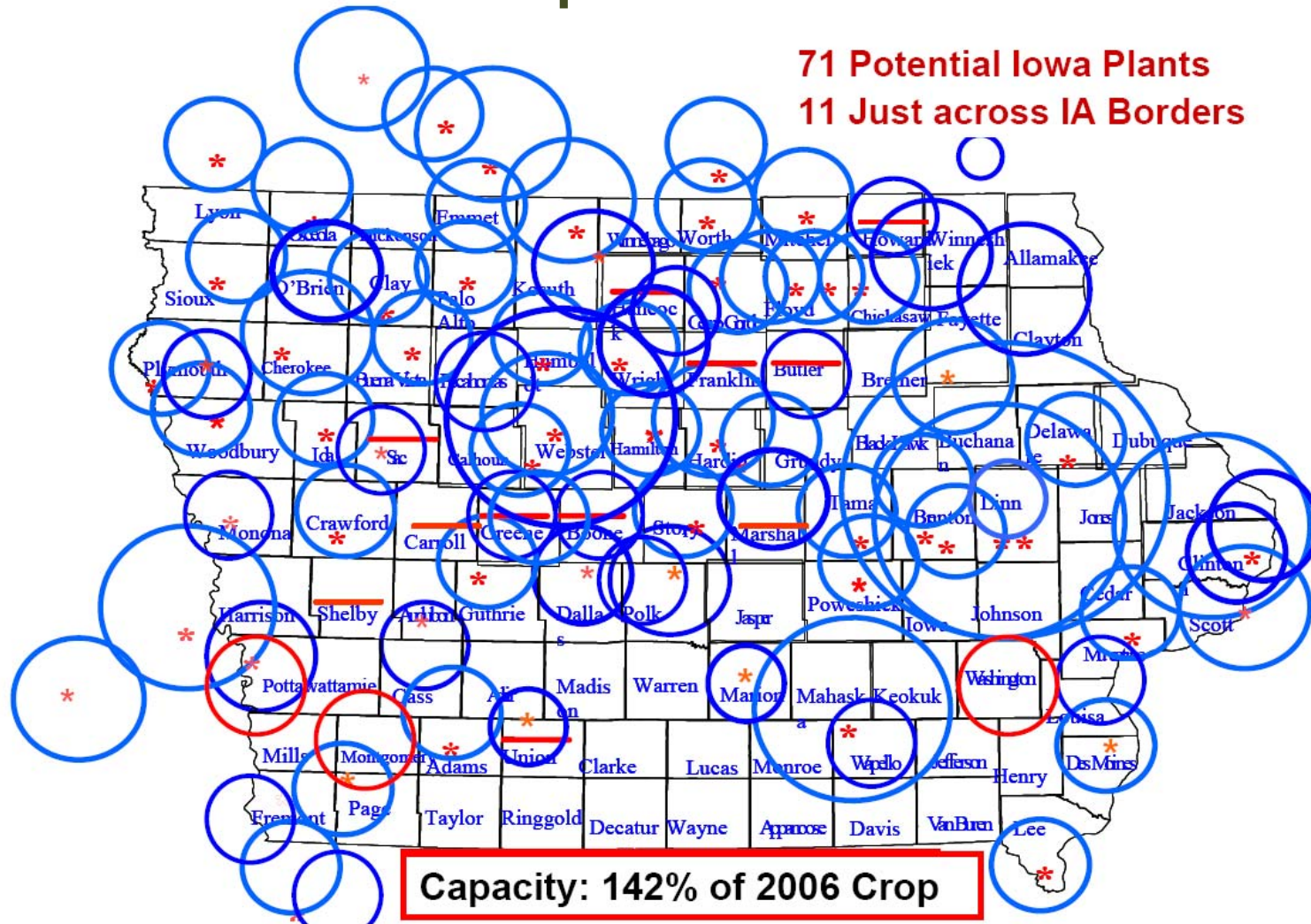
Fractionation: Jimmy Crack Corn...

- Why Crack It? ~ Livestock Producers
 - 17,000,000 market hogs in Iowa on Dec 1

Why are they in IA ~ Cheap Corn

Not so cheap anymore

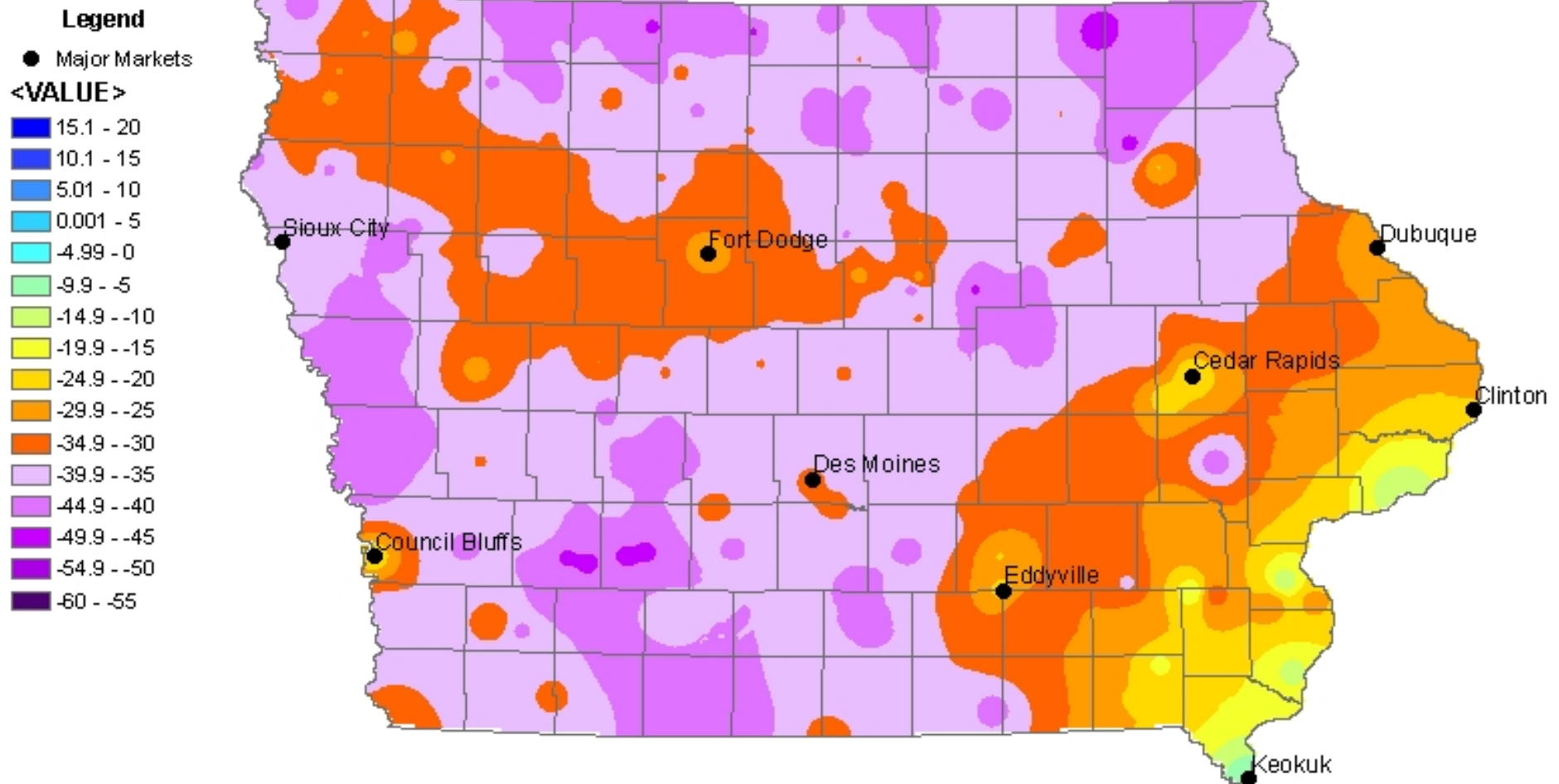
Iowa a Corn Importer?



Iowa Corn Processing Plants, Current & Planned, 5/30/07

JAN 30, 2006 CORN BASIS

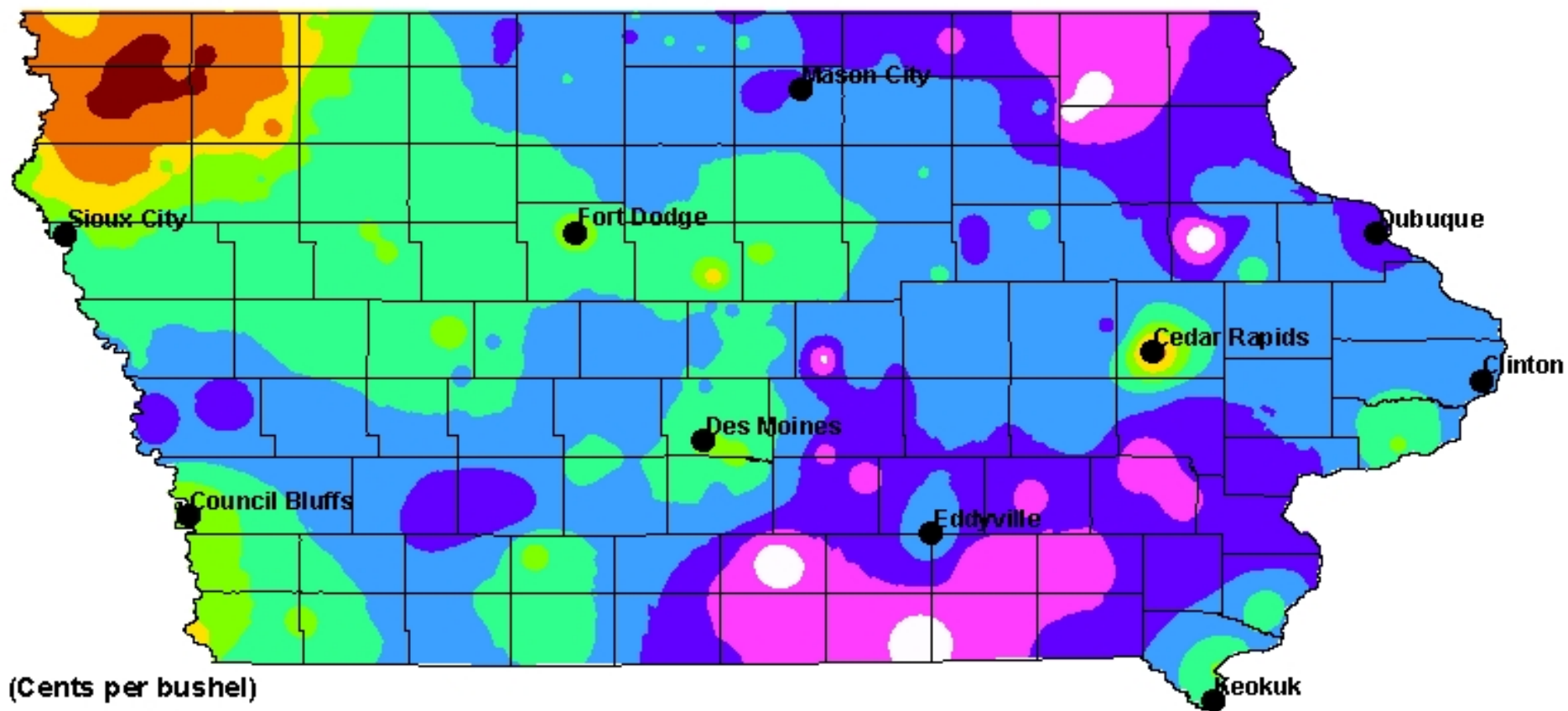
Basis Calculated from CBOT MAR futures Prices 217.8 cents per bushels



Source: CARD, ISU

Jan. 30, 2008 Com Basis

Basis calculated from CBOT Mar. 2008 futures price of \$4.985 per bushel



(Cents per bushel)

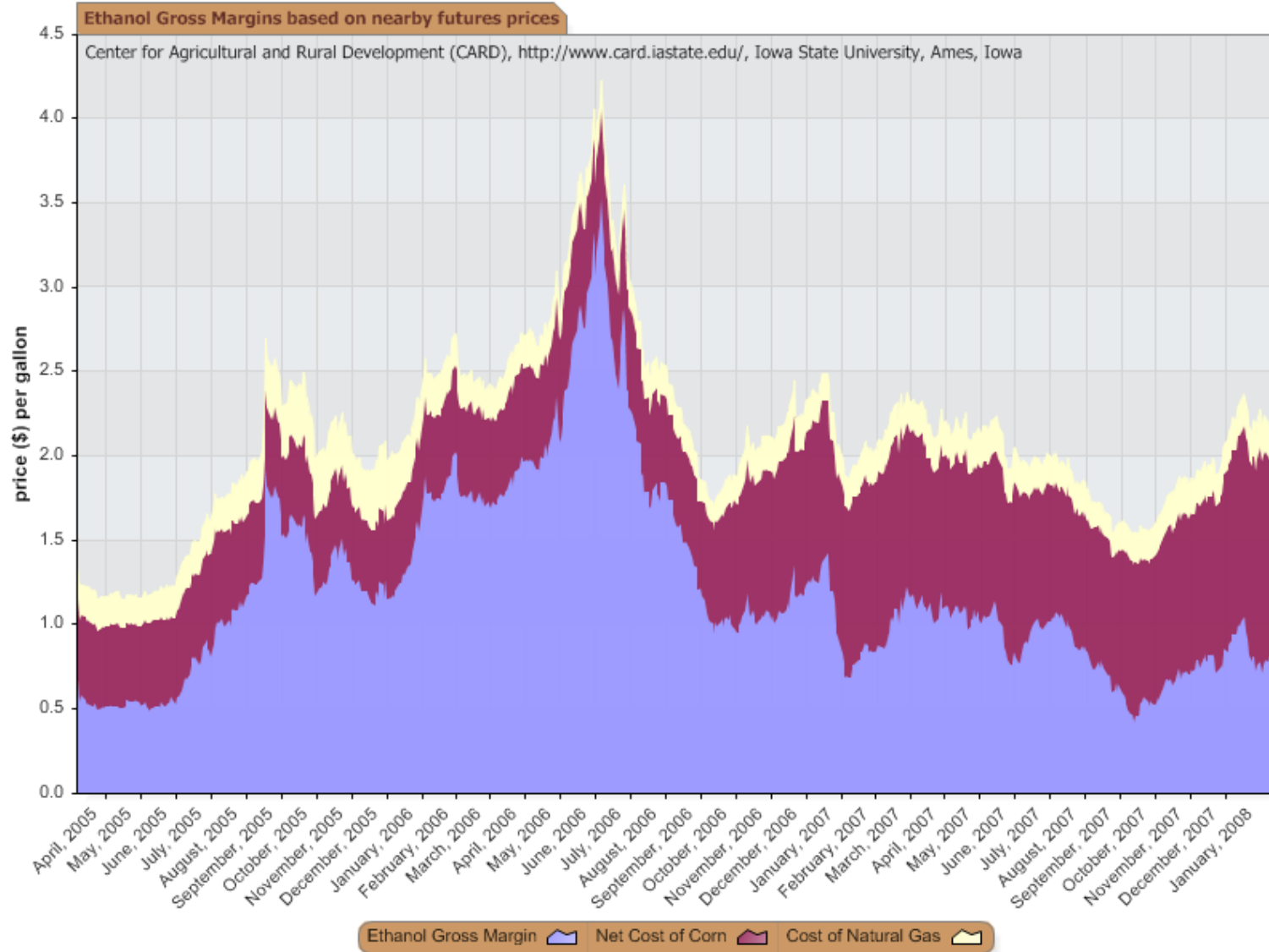
- 59 -- -54
- 53 -- -48
- 47 -- -42
- 41 -- -36
- 35 -- -30
- 29 -- -24
- 23 -- -18
- 17 -- -12
- 11 -- -7

Source: CARD, ISU

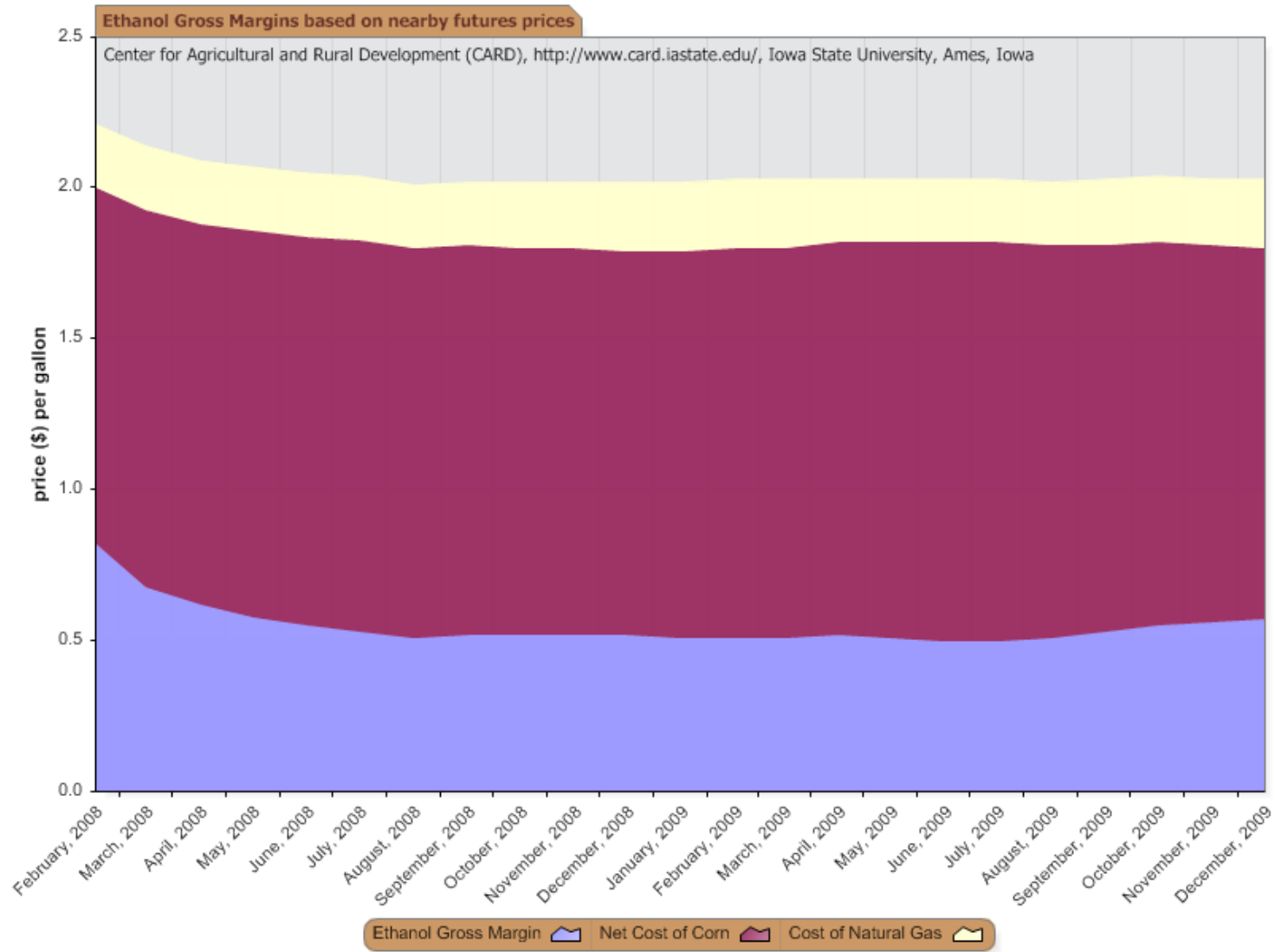


Fractionation: Jimmy Crack Corn...

- Why Crack It? ~ Ethanol Producers
 - Seeking avenues to enhance revenue stream in the face of high feedstock costs



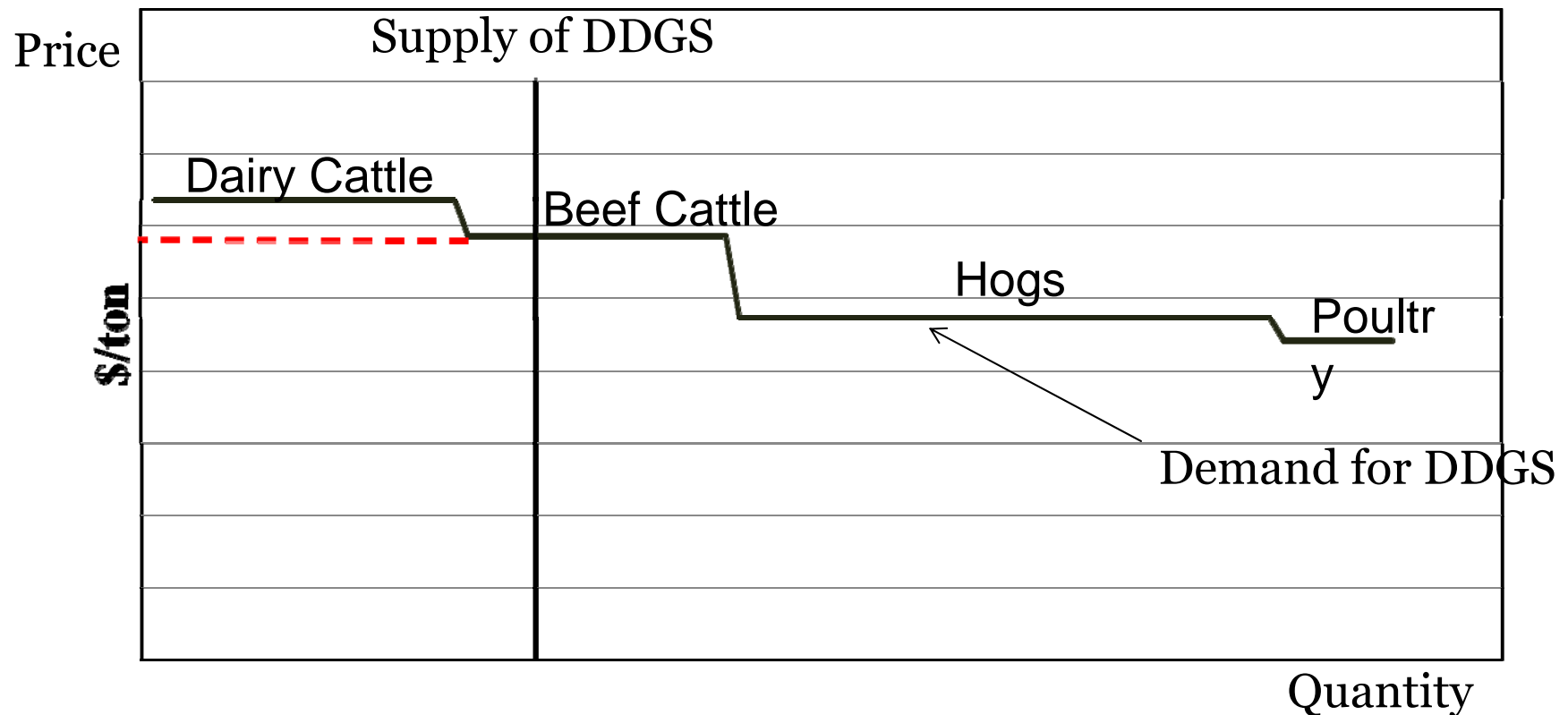
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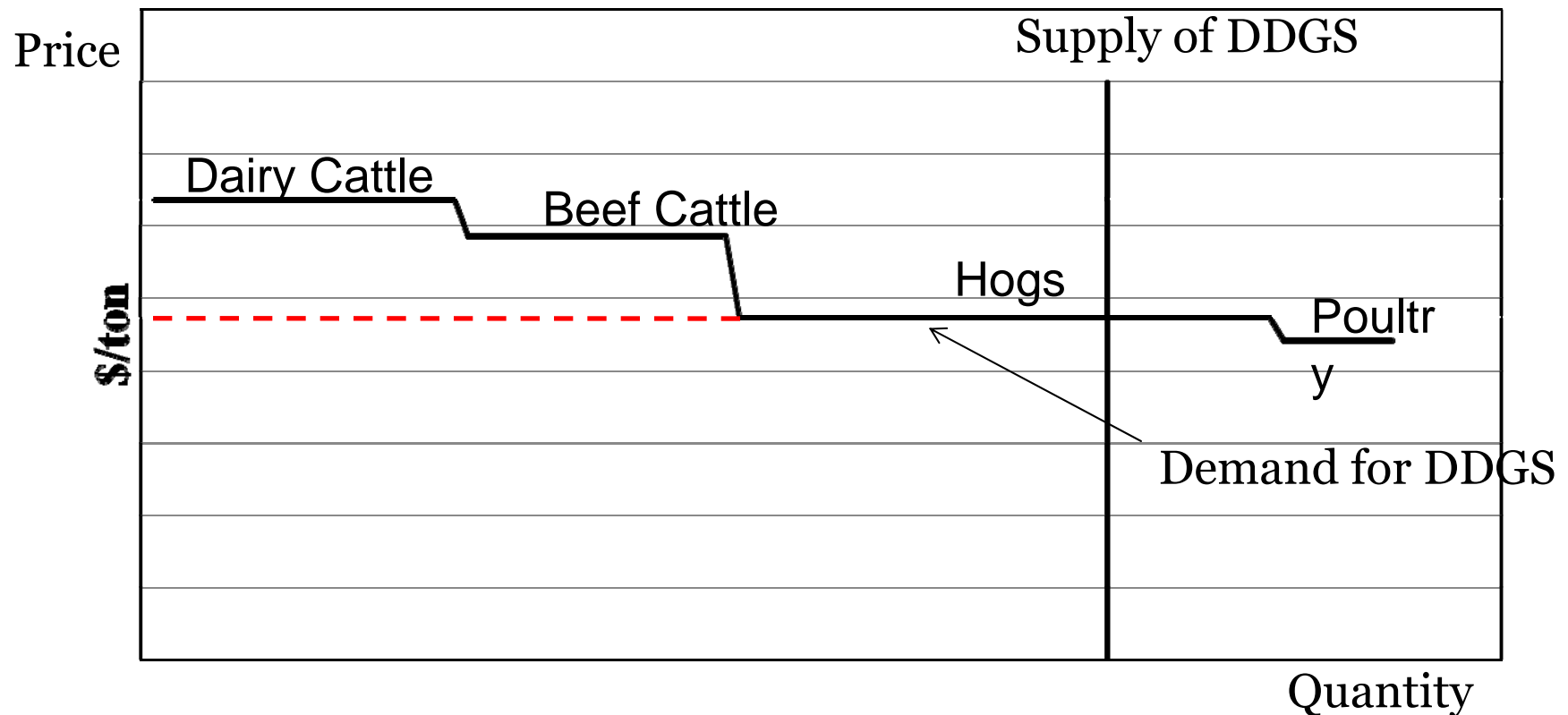
Fractionation: Will it pay?

- How are coproduct market values determined?



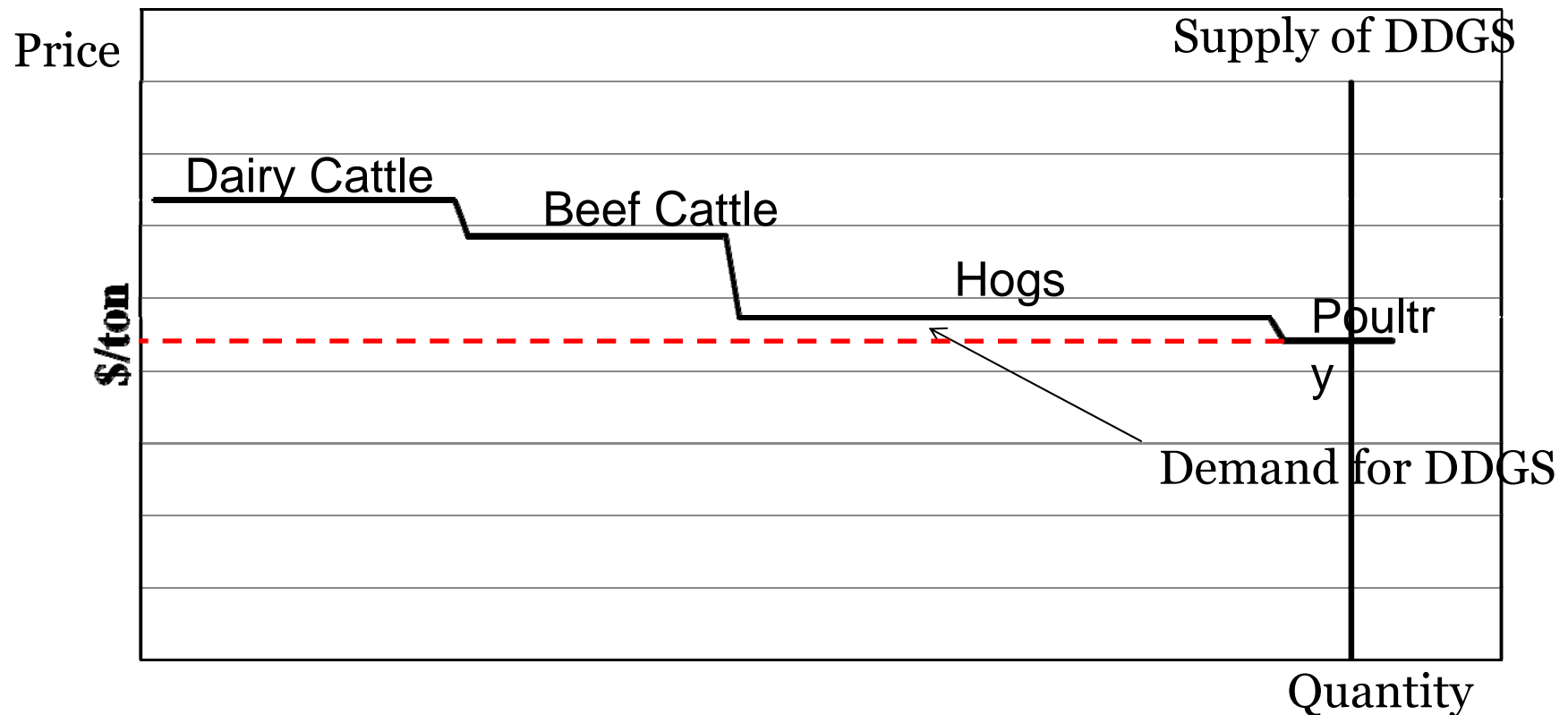
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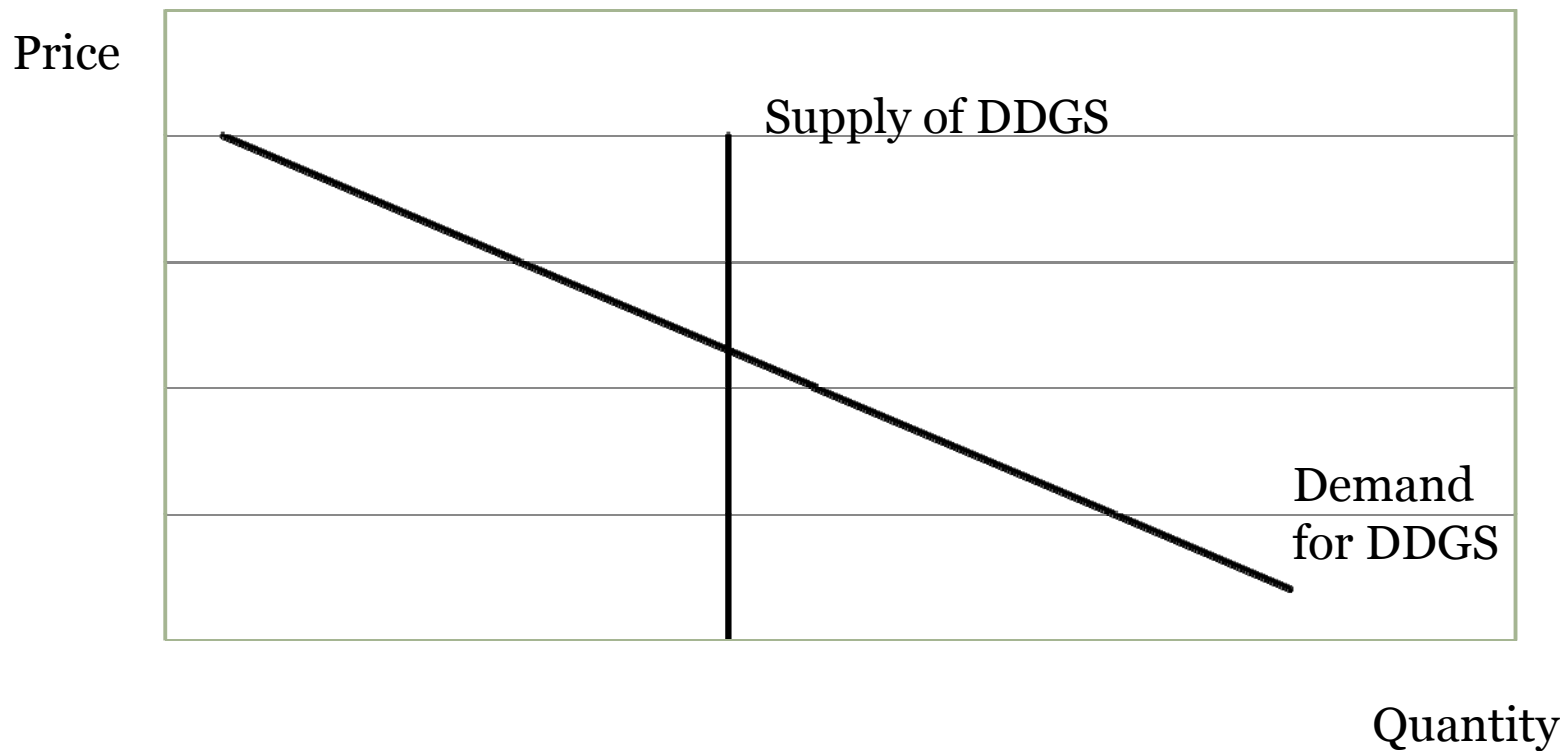
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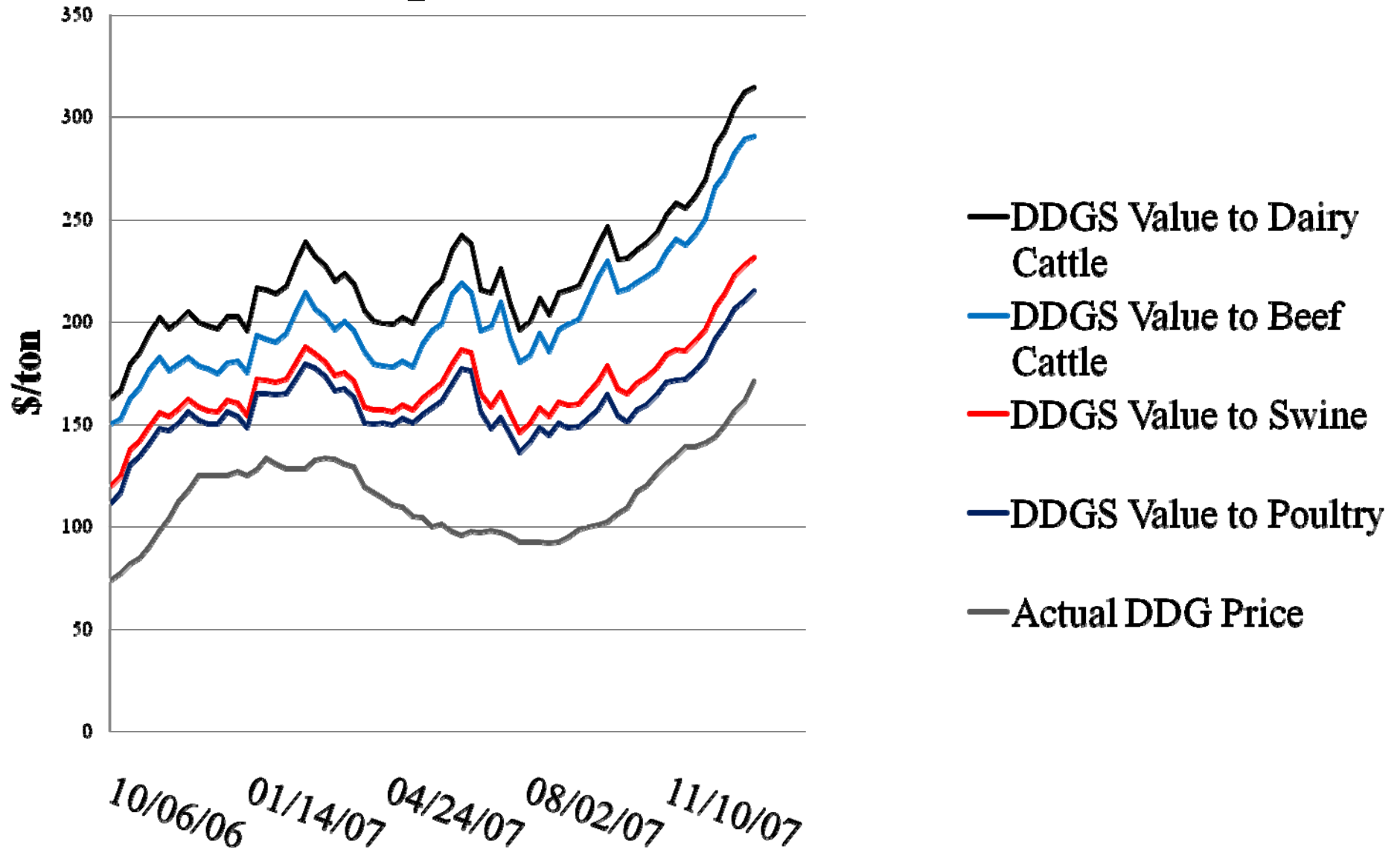




Determining Willingness-to-Pay

- Use Linear Programming to determine “shadow value” of key nutrients

Imputed DDGS Values



Comparing Potential Revenue per Bushel of Corn Processed

	High Protein Meal	High Fat Corn Germ	Corn Bran	Total Revenue Fractionated Products	Total Revenue DDGS
Beef Cattle	\$1.28	\$0.45	\$0.30	\$2.04	\$2.49
Dairy Cattle	\$1.28	\$0.45	\$0.30	\$2.04	\$2.70
Hogs	\$0.96	\$0.45	\$0.29	\$1.70	\$2.01
Poultry	\$0.96	\$0.45	\$0.29	\$1.70	\$1.87

Values computed using AMS/USDA Iowa Ethanol Report corn price of \$4.65/bu and CBOT soybean meal price of \$337/ton on January 14, 2008

Comparing Potential Revenue (\$ per ton)

	High Fat Corn			
	High Protein Meal	Germ	Corn Bran	DDGS
Beef Cattle	\$366.45	\$225.88	\$150.85	\$293.07
Dairy Cattle	\$366.45	\$225.88	\$150.85	\$318.16
Hogs	\$388.92	\$218.62	\$132.11	\$236.14
Poultry	\$274.99	\$224.85	\$143.54	\$220.43

Values computed using AMS/USDA Iowa Ethanol Report corn price of \$4.65/bu and CBOT soybean meal price of \$337/ton on January 14, 2008

Greenhouse Gas Reductions

- Feeding DDGS Displaces Corn and Soybean Meal in Livestock Rations
 - Should be given carbon/ghg credit if valuing emission reductions
 - Linear Programming → How much corn-sbm is displaced
 - Hennessy, Rubin, Babcock (2008) calculate CO₂ equivalent reduced

Carbon Credits: DDGS Displacement

Livestock Species	Feed Ingredient	Feed Displaced (lb/bu)	CO ₂ Reduction (lb/gal)	CO ₂ \$100 per Ton (\$/gal)
Beef Cattle	Corn	10.59	1.35	0.12
	Sb Meal	9.56	1.13	
Dairy Cattle	Corn	14.97	1.90	0.13
	Sb Meal	8.67	1.03	
Hogs	Corn	16.56	2.11	0.12
	Sb Meal	3.75	0.44	
Poultry	Corn	17.81	2.26	0.12
	Sb Meal	2.34	0.28	

Carbon Credits: Displacement from Fractionated Coproducts

Livestock Species	Feed Ingredient	Feed Displaced (lb/bu)	CO ₂ Reduction (lb/gal)	CO ₂ \$100 per Ton (\$/gal)
Beef Cattle	Corn	11.98	1.52	0.11
	Sb Meal	5.22	0.62	
Dairy Cattle	Corn	12.54	1.59	0.10
	Sb Meal	4.69	0.56	
Hogs	Corn	14.32	1.82	0.09
	Sb Meal	1.27	0.15	
Poultry	Corn	13.79	1.75	0.10
	Sb Meal	2.93	0.35	

Conclusions

- Ethanol producers will only fractionate corn if they can generate more profit than producing DDGS
- Willingness-to-pay for coproducts is determined by its ability to substitute for corn and soybean meal in rations
 - And transportation costs
- Ethanol plants should get a ghg credit for displaced corn and soybean meal.