

Issues and Opportunities Related to the Production and Marketing of Ethanol By-Products

Dr. Gerald (Jerry) Shurson

Professor

Department of Animal Science

University of Minnesota

Introduction

□ Processes Used to Produce Ethanol

■ Dry-grind

- Fastest growing segment of the fuel ethanol industry
- By-product is primarily distiller's dried grains with solubles (DDGS)

■ Wet mill

- Produces a variety of products including ethanol
 - e.g. starch, corn oil, high fructose corn syrup

■ Beverage distilleries

- DDGS

■ Breweries

- By-product is brewer's dried grains



What Are the Issues/Challenges?

1. Product identity and definition
2. Product variability
 - a. nutrient content
 - b. nutrient digestibility
 - c. physical characteristics
3. Lack of a quality grading system
 - a. difficult sourcing to obtain desired quality and price
4. Lack of standardized testing procedures
5. Need for quality management and certification
6. Transportation
7. Need a high degree of
 - a. research
 - b. education
 - c. technical support
8. International market challenges
9. Lack of a national distiller's by-product organization
 - a. lack of industry cooperation

1. Product Identity and Definition

- **A case of mistaken identity?**
 - Customers don't ...
 - always understand nutritional differences among ethanol by-products
 - always know what they are going to get

- **A few sellers ...**
 - misrepresent quality and nutrient specifications
 - blend DDGS with other ingredients

- **AAFCO definitions need to be revised**
 - 15. Brewer's products
 - e.g. brewer's dried grains
 - 27. Distiller's products
 - e.g. distiller's dried grains with solubles
 - 48. Maize
 - e.g. corn gluten feed, corn gluten meal



2. Product Variability

- Nutrient content
- Nutrient digestibility
 - Color (amino acid digestibility)
- Physical characteristics
 - Particle size
 - Bulk density

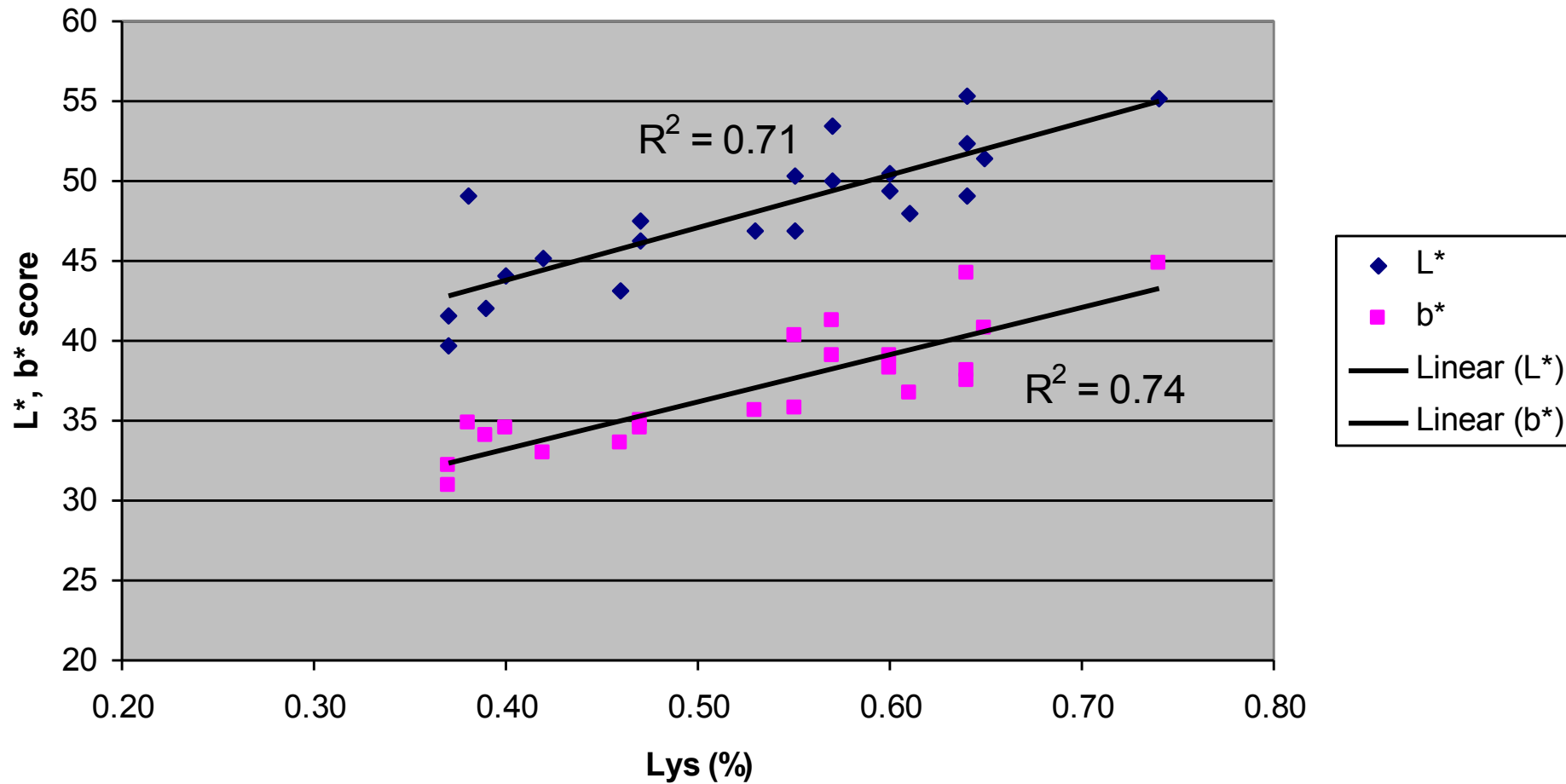
DDGS Varies Nutrient Content and Digestibility, Color, and Particle Size Among U.S. Sources



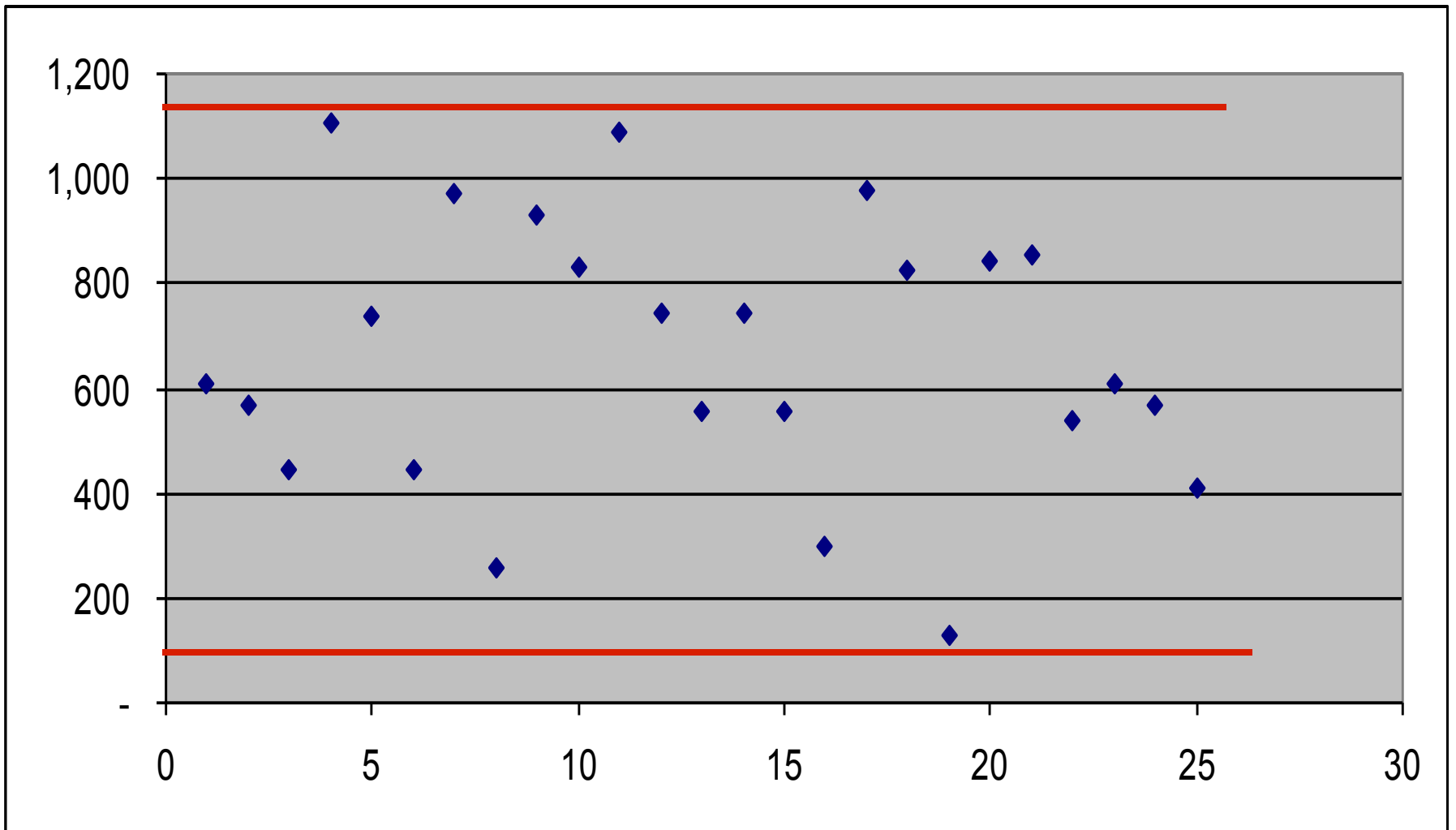
Variability (CV, %) of Selected Nutrients Among U.S. DDGS Sources vs. U.S. Soybean Meal Sources

Nutrient	DDGS	Soybean Meal
Crude protein	4.5	2.3
Crude fat	17.1	30.9
Crude fiber	18.9	9.5
Ash	27.2	6.6
Lysine	12.1	3.0
Methionine	8.5	5.3
Threonine	5.8	4.2
Tryptophan	12.0	7.3
Calcium	117.5	25.8
Phosphorus	19.4	9.1

Fig. 1. Regression of digestible lys (%) and color (L*, b*)

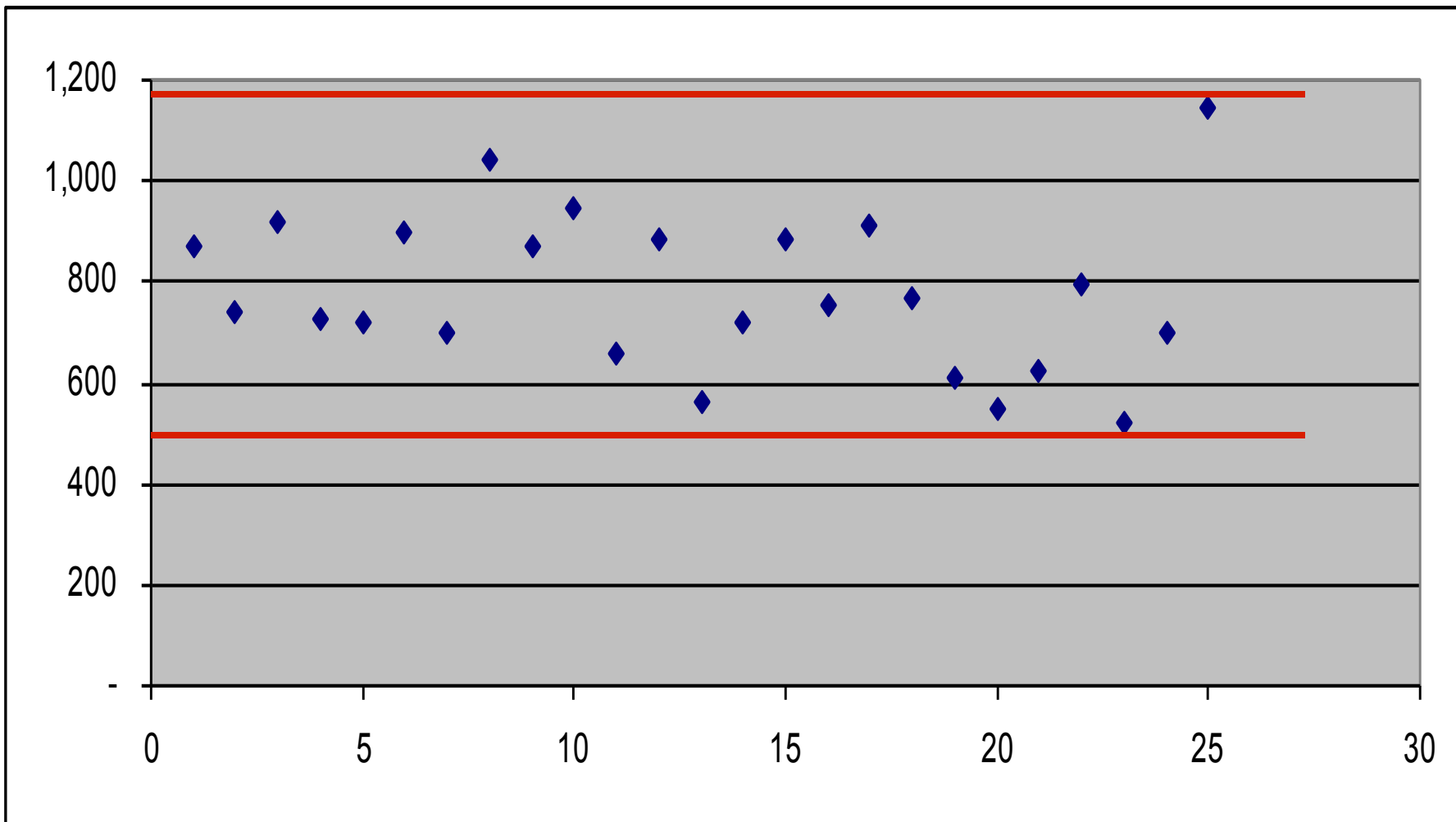


Source: Dr. Sally Noll (2003)



**Variation in Particle Size Among DDGS Samples Representing
25 U.S. Ethanol Plants**

1/05



**Variation in Particle Size Among Soybean Meal Samples
Representing 6 U.S. Plants
2003**



Product Flowability

- ❑ Particle size is sometimes too fine
- ❑ Difficult and costly to pellet
- ❑ Minimal cooling or “curing” time before loading
 - ❑ Extensive damage to trucks and rail cars





3. Lack of a Quality Grading System

- ❑ Difficult for buyers to differentiate quality and price
- ❑ Can be as much as \$20-\$30/ton price differential due to quality in the market
- ❑ “What you want isn’ t always what you get”



4. Lack of Standardized Testing Procedures

- Different labs may use different procedures
 - variable results
- No referee laboratories have been established
- DDGS is unique
 - use of ELISA tests for mycotoxins may give false positive results



5. Need for Quality Management and Certification

- Paradigm shift toward improved DDGS quality and consistency
- Many commercial feed mills are ISO Certified
- EU – International Feed Ingredient Standard
 - GMP Certification
- Minnesota DDGS certification program was not accepted by the MN ethanol industry

6. Transportation

- Railroads no longer allowing use of their cars to transport DDGS
 - DDGS marketers must use their own cars
 - Small ethanol plants don't produce enough DDGS in a short time to use unit trains
- Limited rail capabilities in Ontario
- Concern over rail cars returning from Mexico
- Transloaders in PNW refuse to handle DDGS due to flowability problems



7. Need a High Degree of Research, Education, and Technical Support

- Additional research** is needed to improve DDGS acceptance in the feed industry
- High degree of education and technical support** is required in the market place

8. Export Market Challenges

- **Availability of consistent supply**
 - Need system to directly connect customers to suppliers
 - Poor customer service
 - Difficult to find reliable exporters that market high quality DDGS

- **“Export market is a dumping ground” for low quality U.S. ingredients**

- **Tariffs, definitions, and specifications**

- **Regulatory concerns**
 - GMO
 - GMP certification
 - Antimicrobial residues





9. No National Distiller's By-Product Organization and Coordination

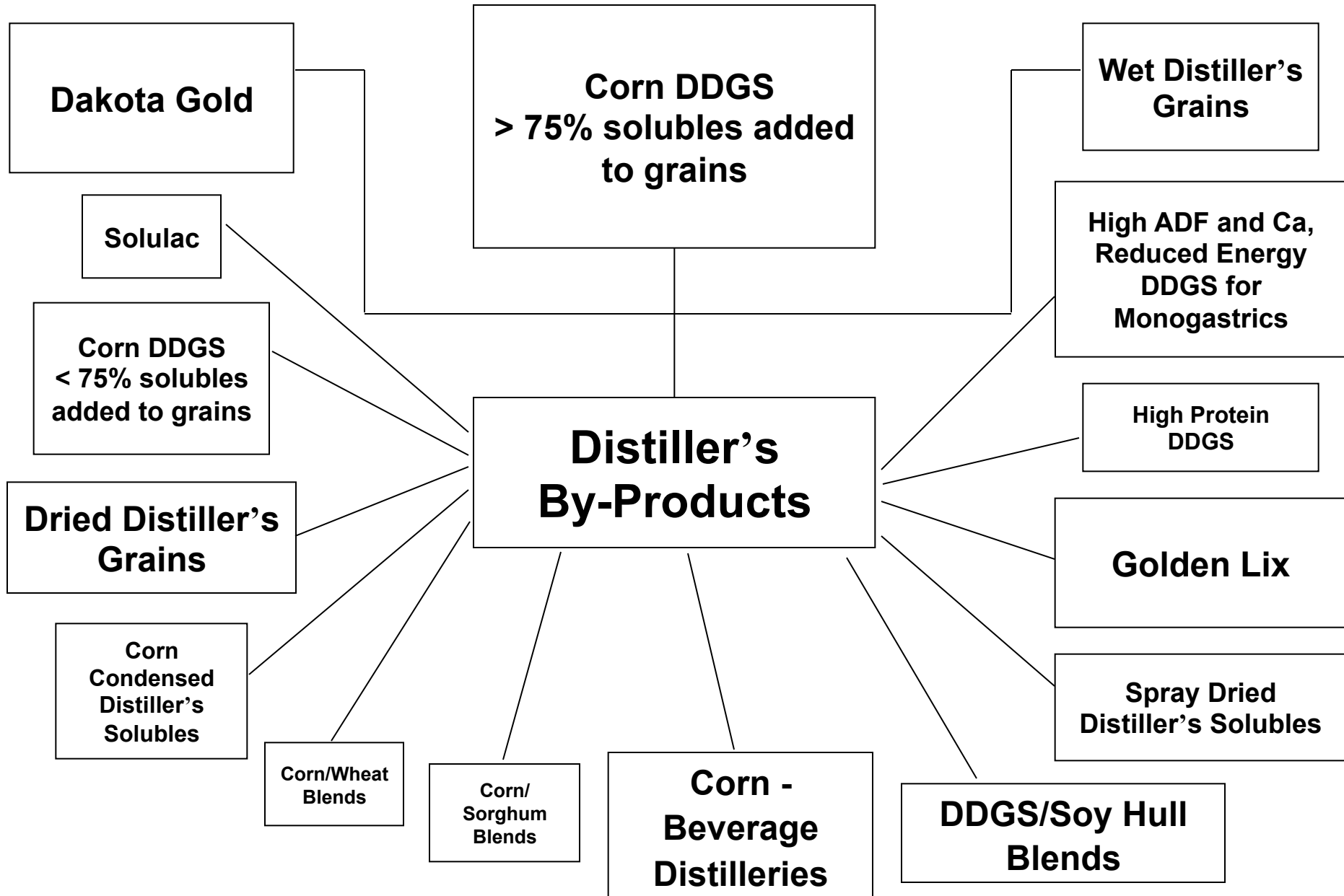
- The U.S. ethanol industry is comprised of a few large, and many small independent ethanol plants.
- **No single national organization** to coordinate and deal with by-product issues and opportunities



Opportunities

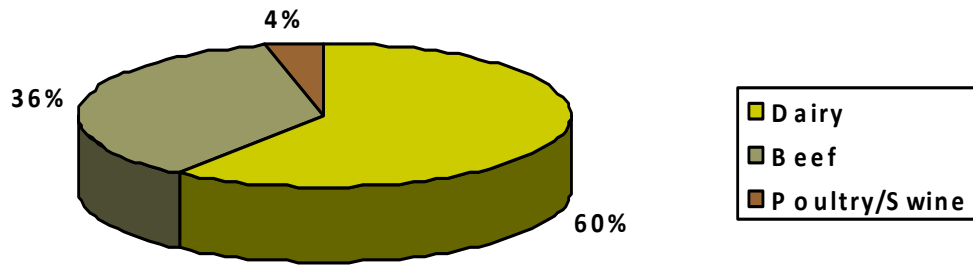
1. Develop a national DDGS organization
 - Assemble a national DDGS technical team
 - develop new definitions for distiller's by-products
 - develop standardized laboratory testing procedures
 - develop quality standards
 - by-product vs co-product vs product
 - develop a voluntary national certification program

Potential Categories of Distiller's By-Products

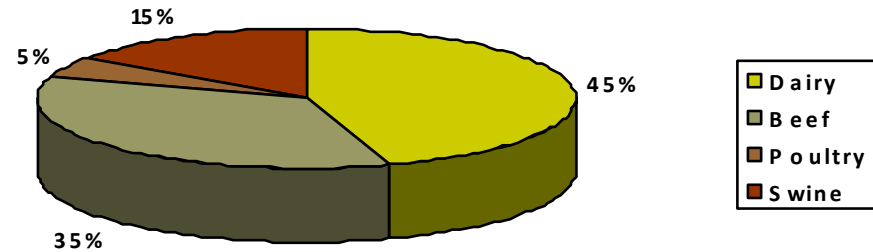


U.S. DDGS Consumption

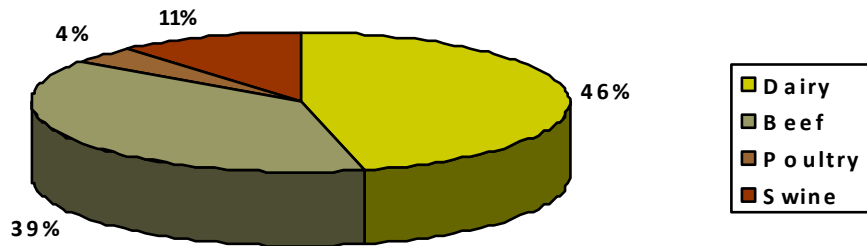
Estimate 2001



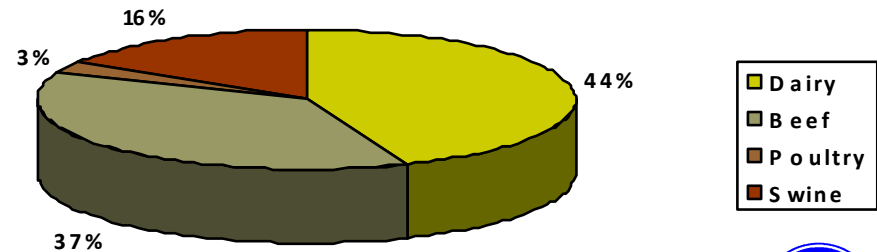
Estimate 2002



Estimate 2003



Estimate 2004



8 Million MT of DDGS Produced in the U.S. Would Disappear If...

- ❑ Every broiler, layer, and turkey ate 0.10 lbs/day

OR

- ❑ Every beef steer, cow, and calf ate 4.8 lbs/day

OR

- ❑ Every dairy cow ate 8 lbs/day

OR

- ❑ Every hog ate 0.84 lbs/day





What Does the U.S. Ethanol Industry Need to Do?

- ❑ Determine the commitment to export DDGS
- ❑ Correctly define its products
- ❑ Know your products and how customers can optimize their use
- ❑ Improve customer support and technical assistance
- ❑ Fund research to support current domestic and export market development efforts
- ❑ Implement quality standards to help customers differentiate among sources and prices
- ❑ Implement a national DDGS certification program



www.ddgs.umn.edu