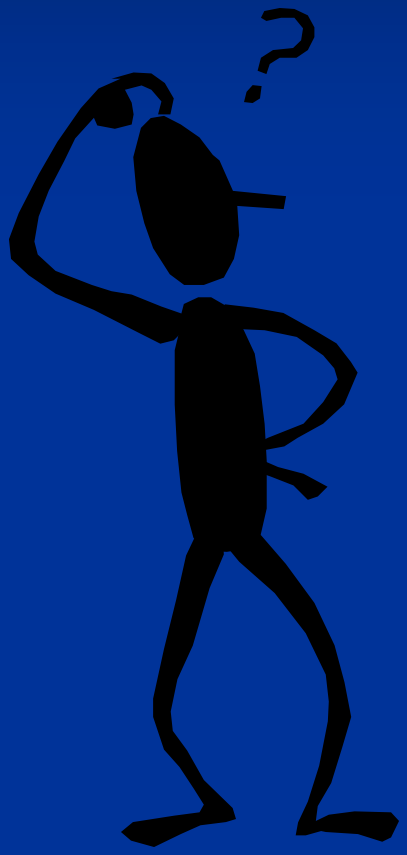
What's New Since Sept. 2005 in DDGS Feeding to Poultry

Sally Noll

University of Minnesota

Minnesota Nutrition Conference,
2006

Introduction (What happened in 2005??)



- 2005 Presentation by Dr. Shurson Covered:
  - Nutrient Characteristics of DDGS
  - New Co-products
  - Feeding Value for Swine
  - Feeding Value for Poultry

Since 2005

- Publications examining lysine digestibility, color, and ME
- Completion of turkey feeding trial
- Reduced ammonia emissions (ISU, Bregendahl, 2006)

DDGS Characteristics for Poultry

- Lysine digestibility, color and metabolizable energy
  - Batal and Dale, 2006
    - Samples from 6 plants in Midwest
  - Fastinger et al., 2006
    - Samples from 5 plants in Midwest (corn)

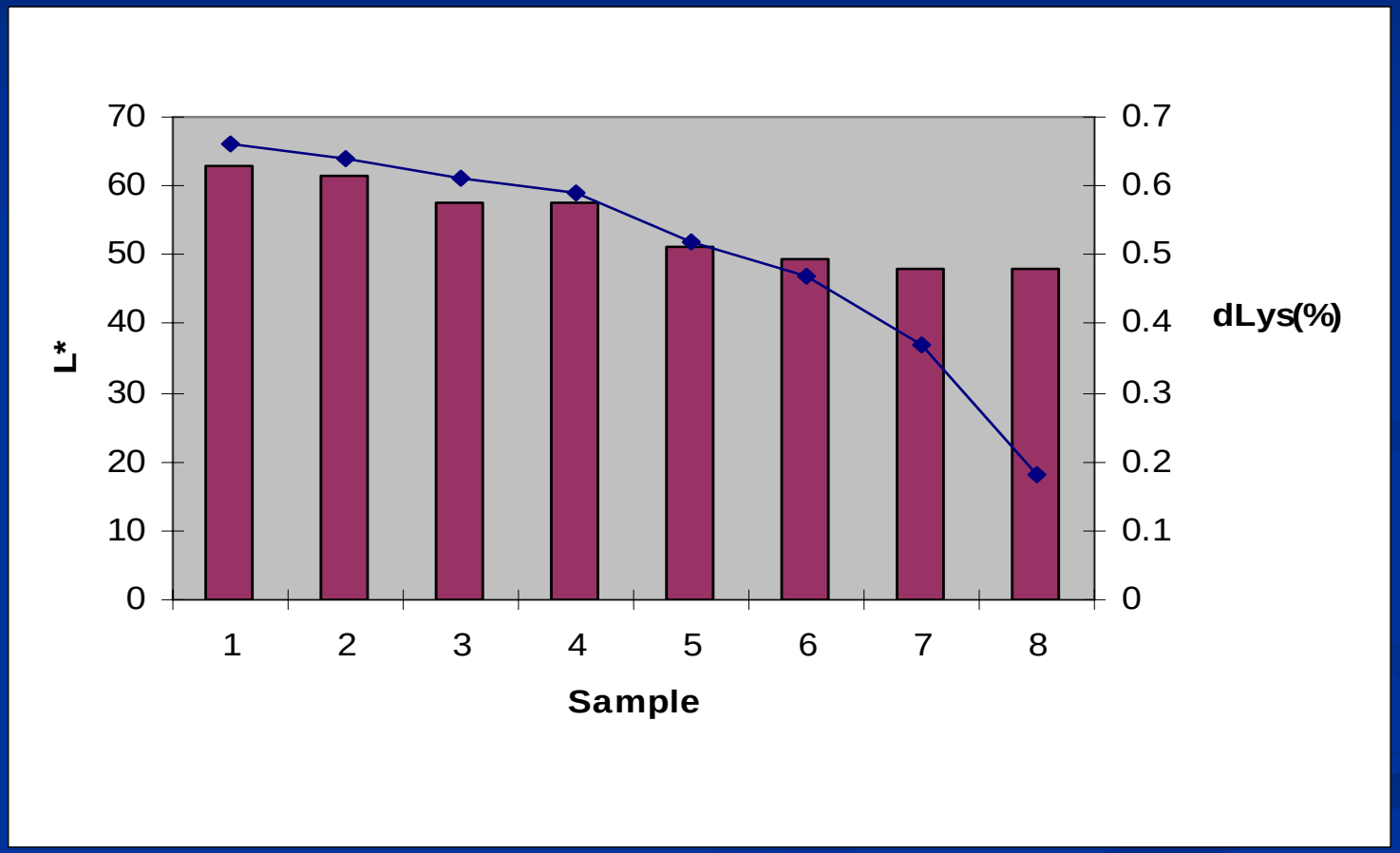
Lysine Content and Digestibility

Source	No. of Samples	Lysine Content (%)		Lysine Digestibility Coefficient (%)	
		Ave	Range	Ave	Range
Batal and Dale 2006[2]	8	.71	.39-.86	70	46-76
Fastinger et al. 2006[1]	5	.64	.48-.75	76	65-82

Lysine Content and Digestibility

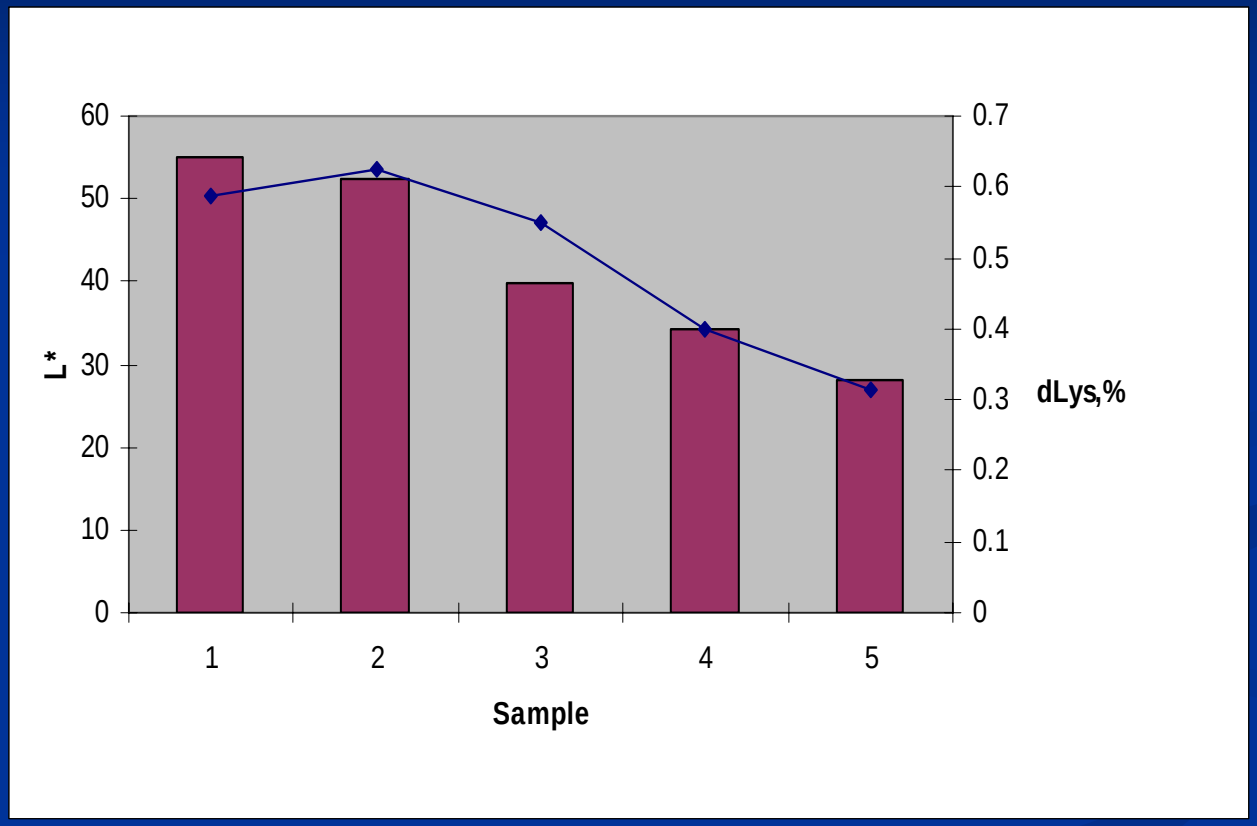
Source	No. of Samples	Lysine Content (%)		Lysine Digestibility Coefficient (%)	
		Ave.	Range	Ave.	Range
Ergul et al. 2003[1]	**20**	**.73**	**.59-.89**	**72**	**59-84**
Batal and Dale 2006[2]	8	.71	.39-.86	70	46-76
Fastinger et al. 2006[1]	5	.64	.48-.75	76	65-82

DDGS Color and dLys Content



Batal and Dale, 2006

DDGS Color and dLys Content



Fastinger et al., 2006

DDGS and Color

- Batal and Dale, 2006
- Samples with less than .5% dLys
  - L* less than 50

- Fastinger et al., 2006
- Samples with less than .5% dLys
  - L* less than 34

Metabolizable Energy (TMEn) of DDGS

	Batal & Dale*			Fastinger et al.**	
Composition	Ave (sd)	Range		Ave	Range
TMEn (kcal/kg)	2820 (181)	2490-3190		2871	2484-3047
CP,%	27 (2)	23-30		28	27-29.8
Cr. fat, %	8.8 (2.3)	2.5-10.6			
Cr. fiber,%	6.6 (.8)	5-8			
Ash,%	4.4 (.4)	3.9-5.4			

*Adjusted to 86% DM ** As fed basis

Prediction Equations for TME (86% DM basis)

Variable (%)	Equation	R^2
Fat	2439.4+43.2(fat)	.29
Fat, fiber	2957.1+43.8(fat)-79.1 (fiber)	.43

Batal and Dale, 2006

Differences in TMEn

- Weak relationship to fat content
- Reduced with overheating?

Variability in Nutritional Characteristics

- Corn nutrient content
- Processing
  - Drying conditions
  - Solubles
    - Variability in composition of syrup (solubles) and wet grains (mash) among plants (Knott et al. 2004)

Varying Solubles Addition

- Measure effect on nutritional characteristics of resulting DDGS
- Can rate of addition indirectly effect amino acid digestibility?

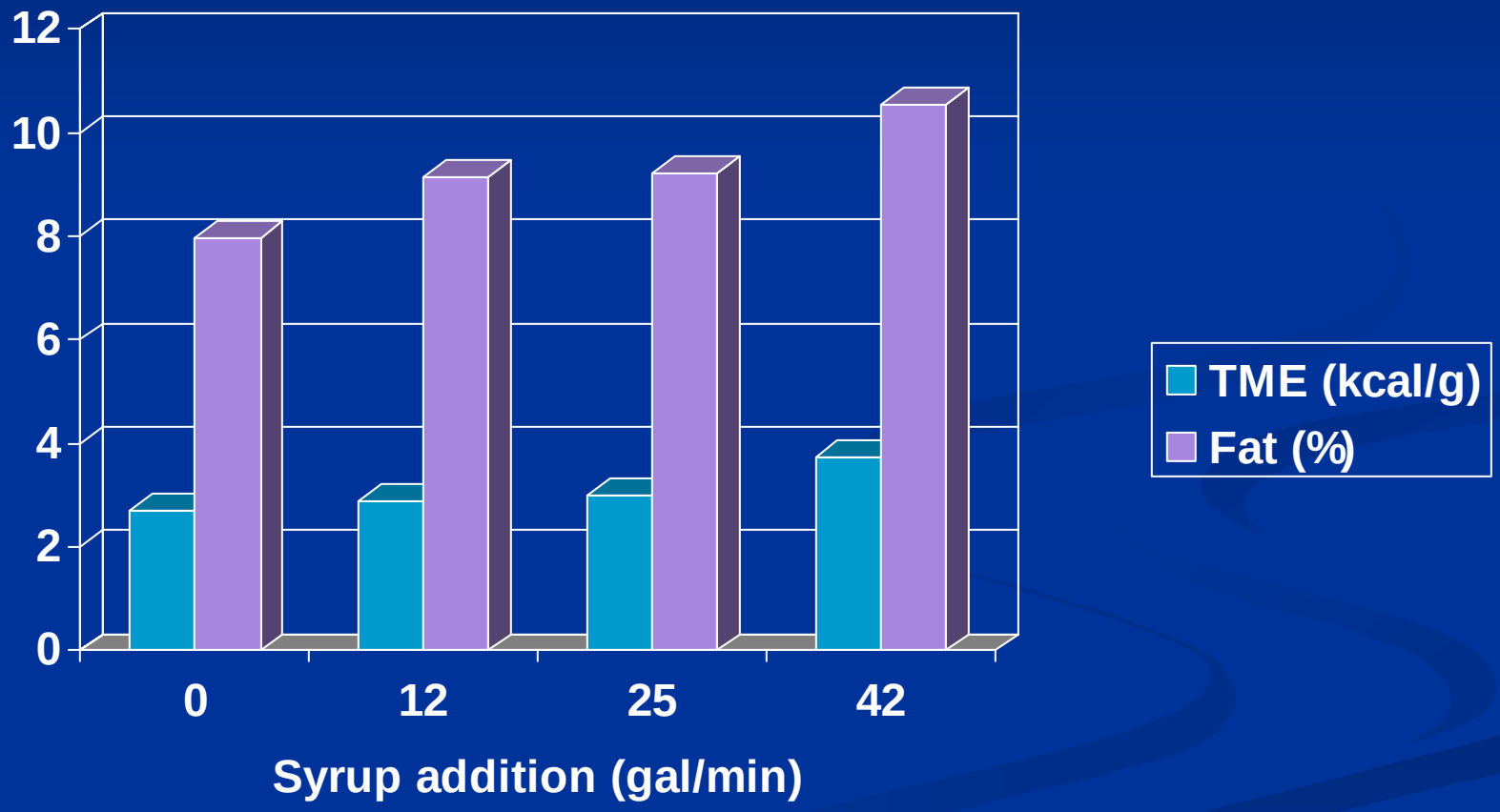
Variable Solubles Addition & DDGS Characteristics-Pilot Study

- Four Syrup Addition Rates
  - 42, 25, 12, 0 gal/min
- DDGS Samples taken from each lot
  - Chemical analyses
  - Amino acid digestibility
  - TME
- Pearson Correlations with addition rate

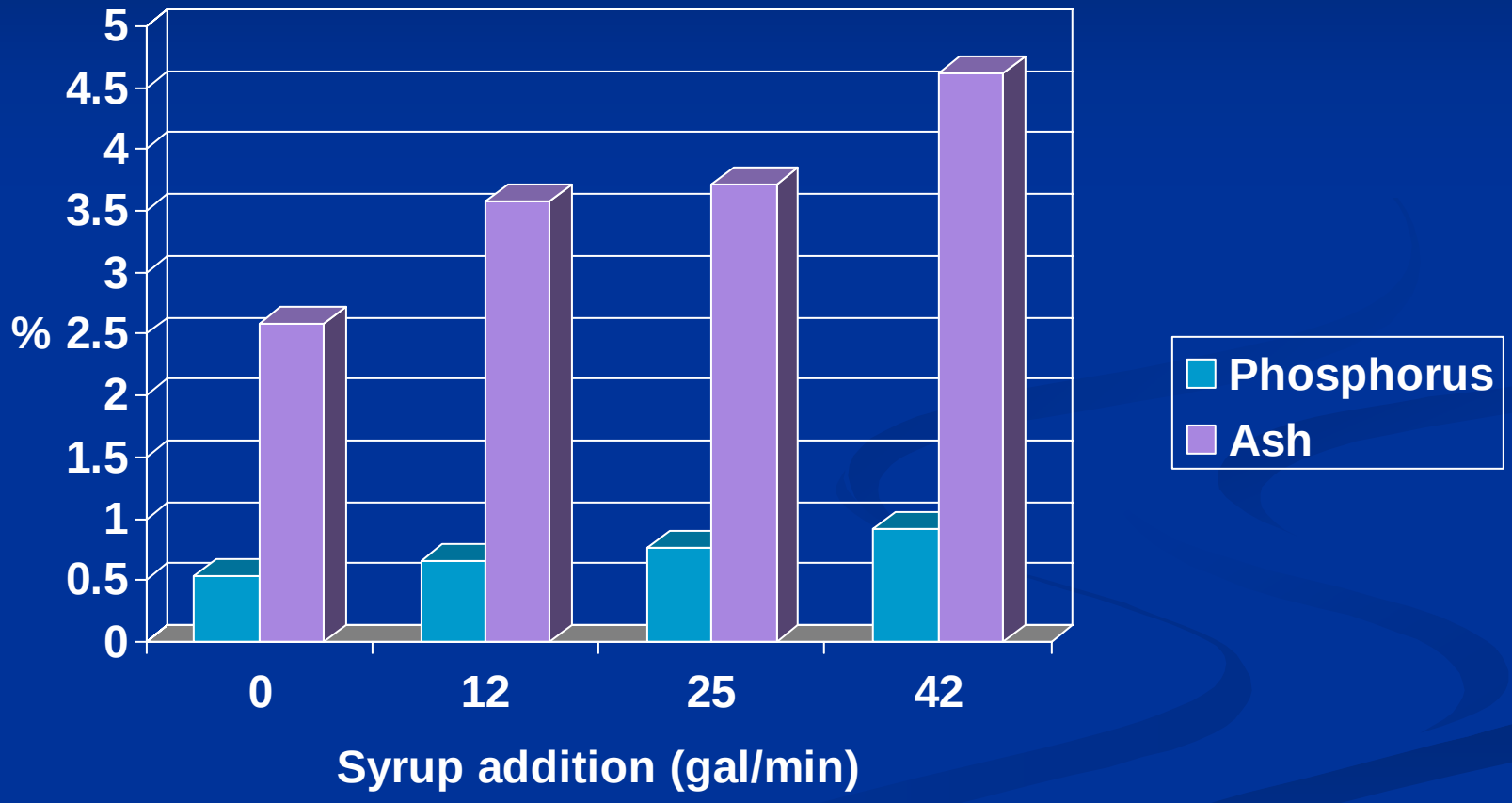
Variable Solubles Addition & DDGS Characteristics

- No effect
  - Protein, amino acids content
  - Amino acid digestibility mostly not affected
- Significant correlation found for:
  - Color
  - Crude fat
  - Ash
  - Minerals
    - P
  - TMEn

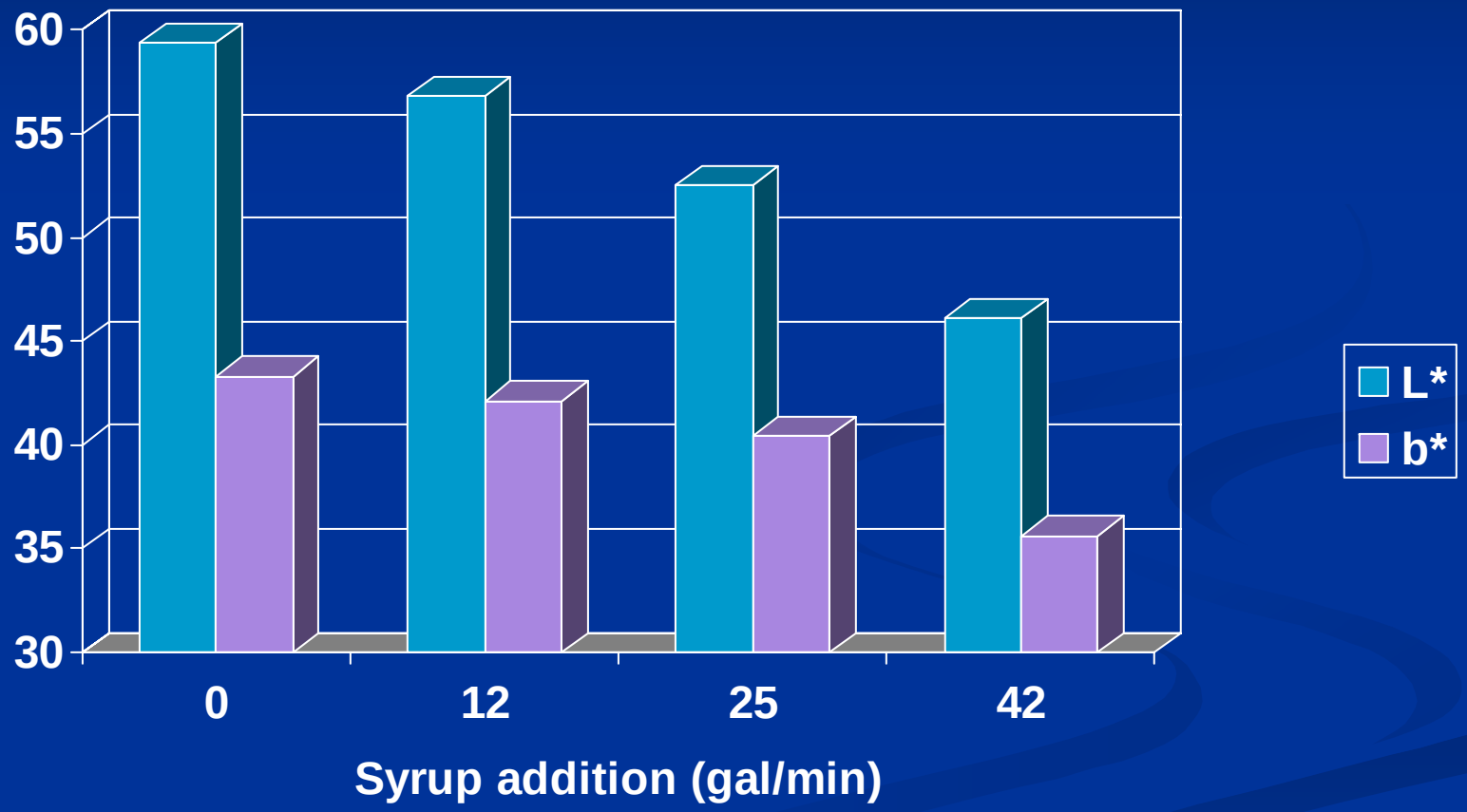
Influence of syrup addition on DDGS fat content and TMEn (DM basis)



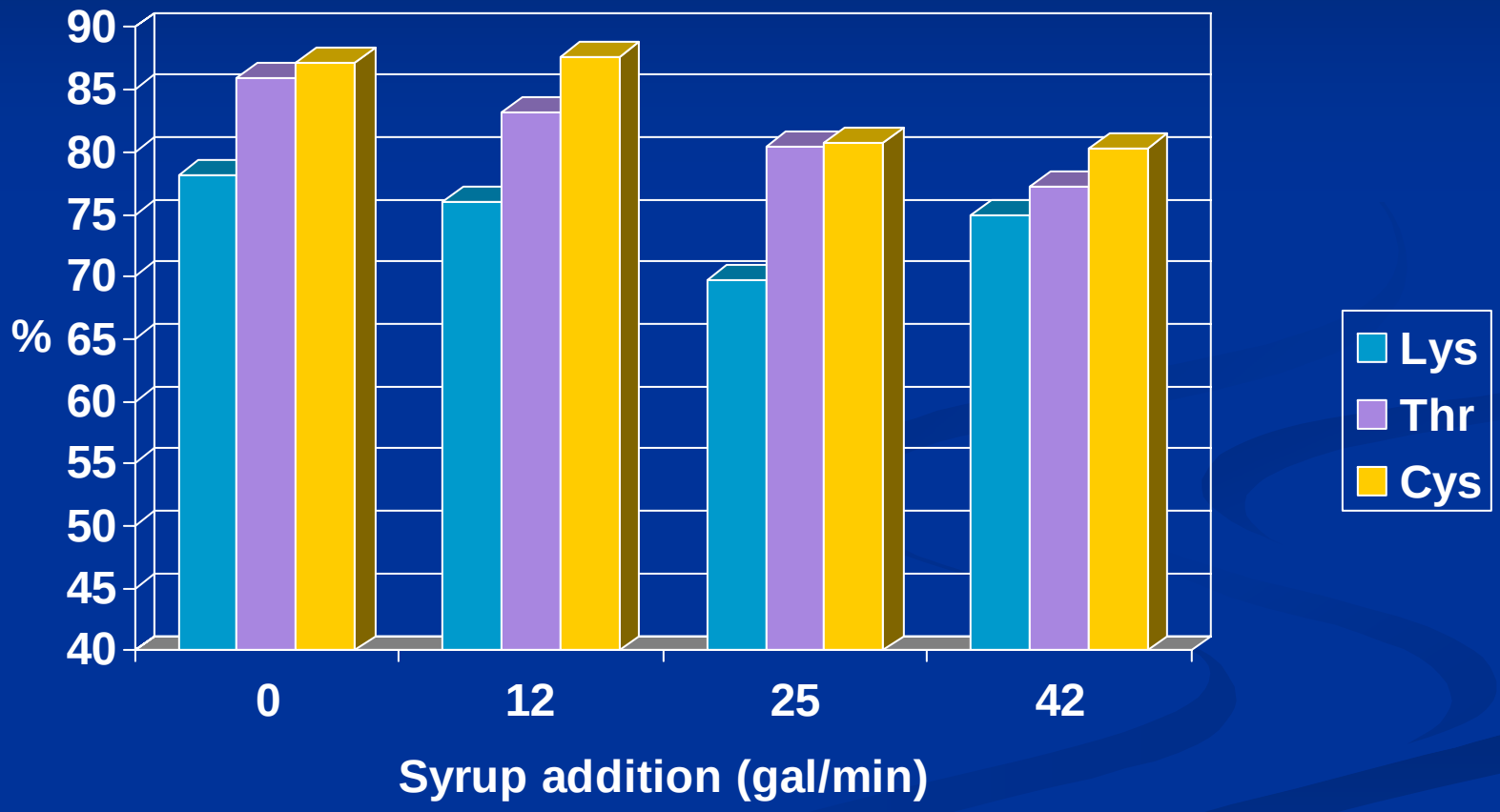
Influence of syrup addition on DDGS ash and phosphorus content (DM basis)



Influence of syrup addition on color (L*, b*) of DDGS



Influence of syrup addition on amino acid digestibility coefficients of DDGS



Thr r=.99 (P<.02)

Variable Syrup Addition

- Changed composition of resulting DDGS
- Minerals (P), fat, color, and energy changed

Feeding Value for Poultry (Market Tom Turkeys)

- 10% level of inclusion acceptable
- What are maximum feeding levels
  - 5, 10%
  - 10, 15%
  - 20% or greater??
- Concerns
  - Dietary protein (amino acid balance)
  - Phosphorus content
  - Age (feeding period)
  - Season

Market Turkey Study

- Examine DDGS utilization in combination with maximal inclusion levels of animal byproduct in grow/finish diets for male turkeys
- DDGS inclusion levels 0, 10, and 20%
- PBM inclusion levels of 0, 8, and 12%

Methods

- ***Diets***
- Diet formulations adjusted for age
- Ingredients assayed for proximates and digestible amino acids
- Formulated to provide 100% digestible thr and supplemented with met and lys
- Isocaloric to control
- Ratio of calcium to available phosphorus maintained at 2:1
- Fed as mash
- Experimental period 5 – 19 wks of age

- ***Turkeys***
- Male Large White, Nicholas strain
- 10 birds/pen, 8 replicate pens/treatment

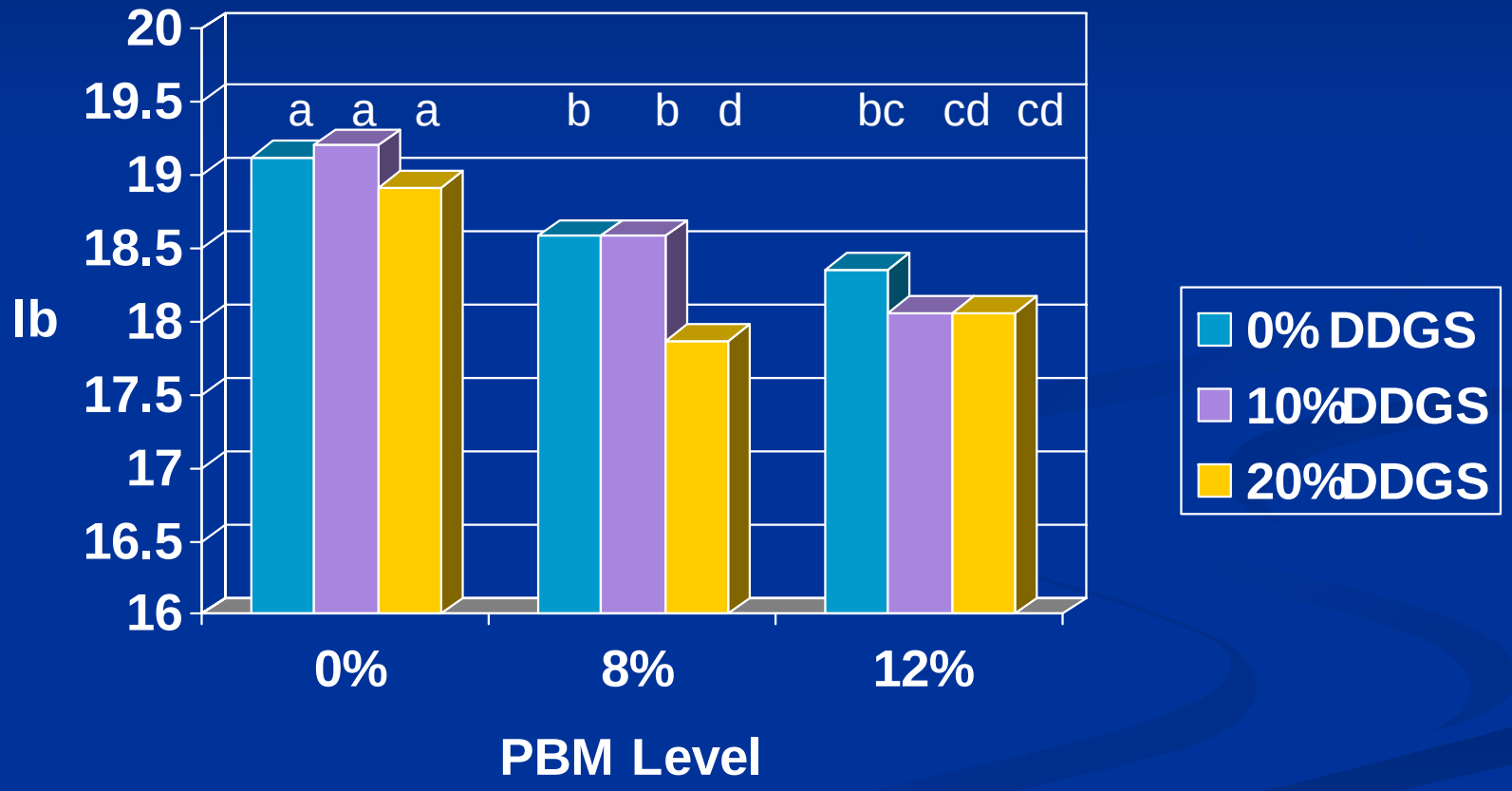
Diet Composition (%)
Selected Diets 5-8 wks of Age

Ingredient	Trt 1	Trt 3	Trt 5	Trt 9
Corn	46.62	55.10	33.60	41.24
SBM	43.05	29.62	35.36	22.07
PBM	0	12	0	12
DDGS	0	0	20	20
Dl-met	.18	.17	.155	.147
L-lys HCl	.112	.137	.289	.312
Animal fat	5.27	2.01	6.03	3.08
Dical	2.56	.03	2.259	-----

Results

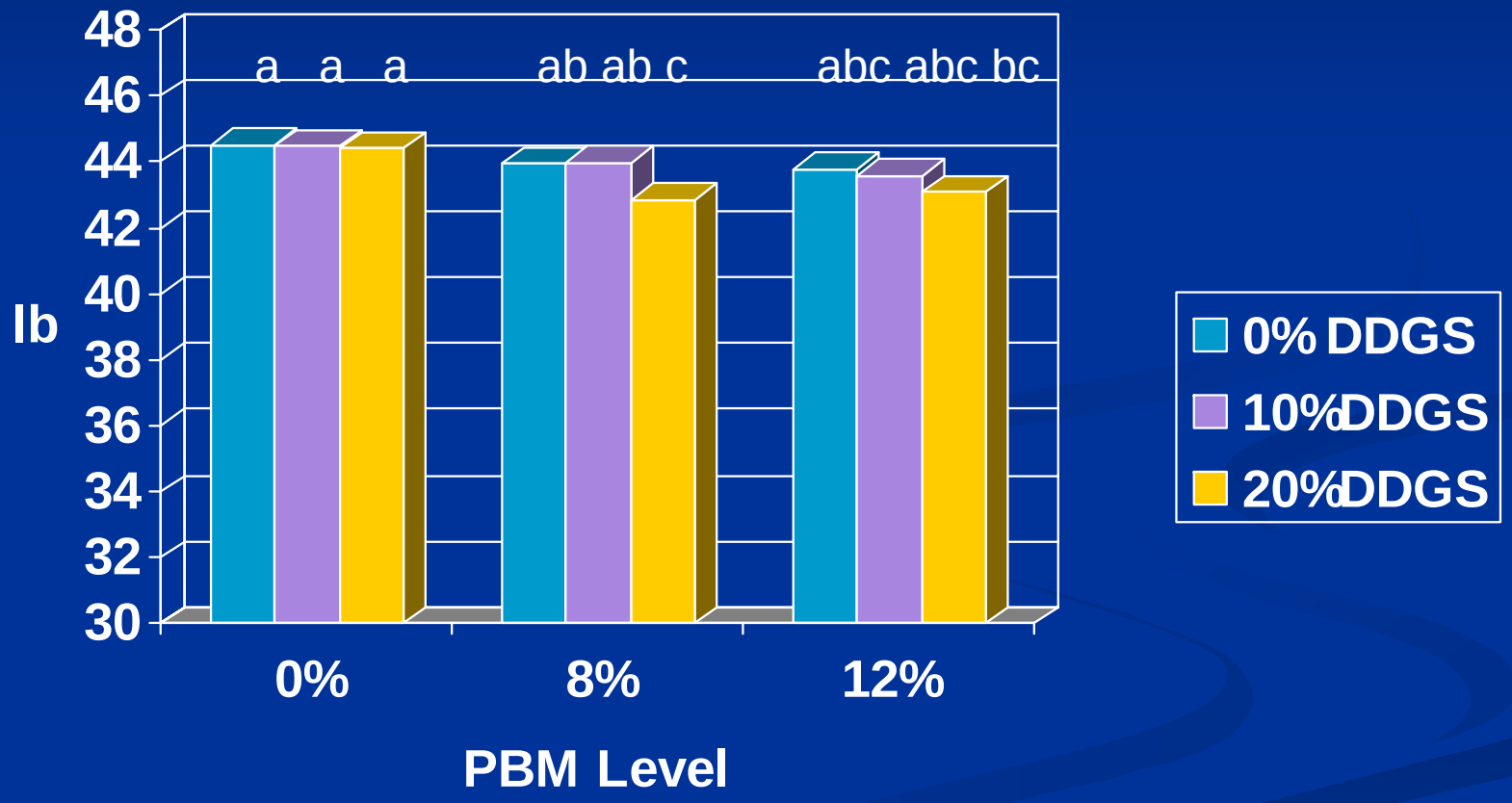
- Diet affected body weight and feed efficiency
- Interaction of DDGS and PBM observed for body weight at 11 wks of age and feed efficiency (experimental period 5-19 wks of age)

Body weight response to DDGS and PBM at 11 wks of age

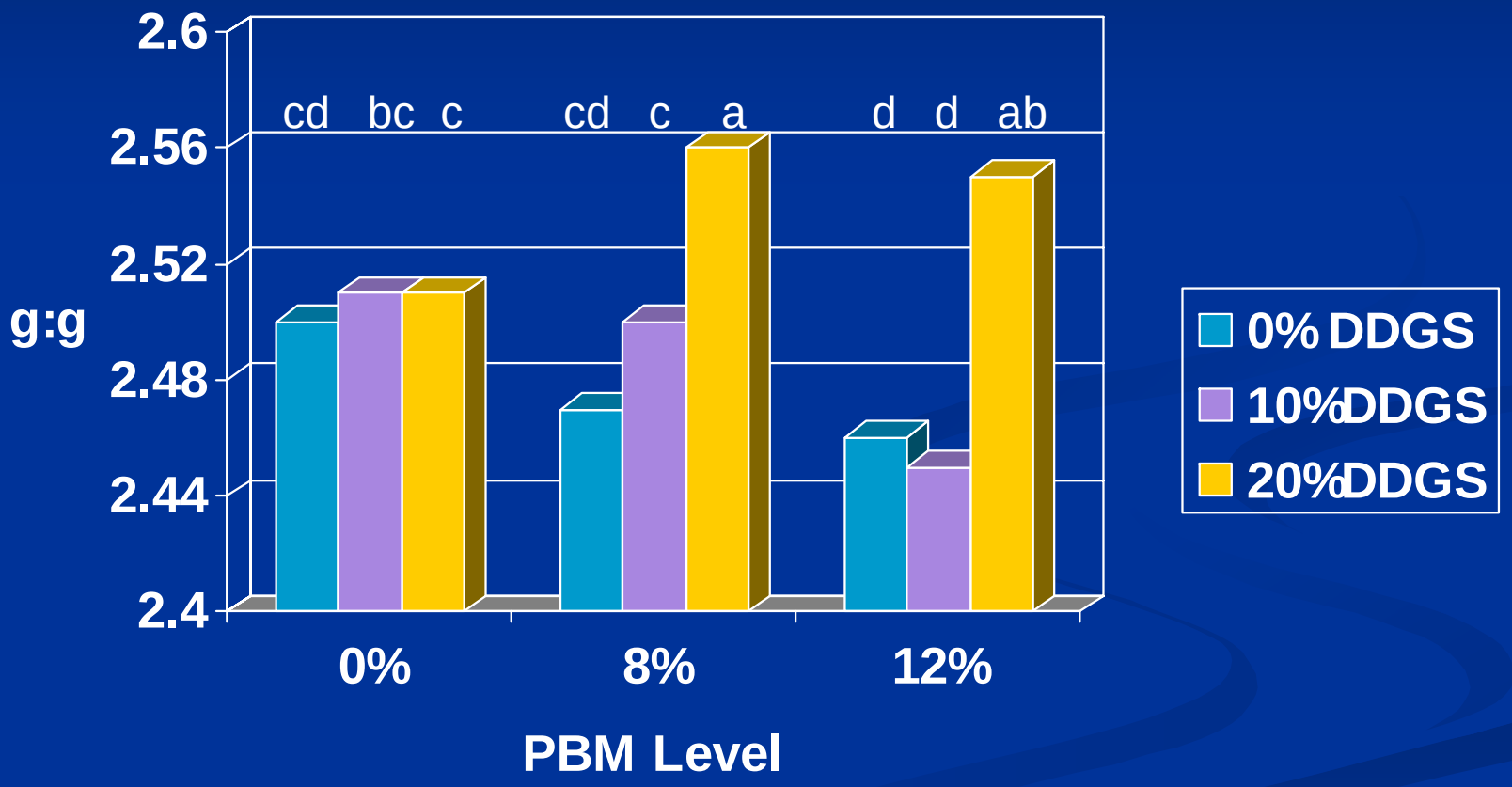


DDGS*PBM P<.023

Body weight response to DDGS and PBM at 19 wk BW



Interaction of DDGS and PBM on 5-19 wk F:G



DDGS x PBM (P<.02)

Conclusions

- In comparison to a corn-soy control diet, addition of PBM at 8 or 12% depressed body weight to 11 wks of age.
- In comparison to a corn-soy control diet, addition of 10 or 20% DDGS resulted in similar performance
- In comparison to a corn-soy control diet, addition of both PBM and 20% DDGS resulted in poorer performance, although performance of birds in the trial was very acceptable regardless of treatment.

Summary-DDGS Update

- Lys digestibility averaged 73%
- Lighter color associated with high dLys
- Absolute color values (L*) varies with data set and may be influenced by level of solubles addition
- Metabolizable energy as TME averaged 2820 and 2870 Kcal/kg in two studies
- Solubles addition changes nutrient content
- Feeding trials – up to 20% DDGS in corn-soy diets; up to 10% in corn-soy-meat based diet

Acknowledgments-UM Turkey Research Program

- University of Minnesota staff-Jeanine Brannon, Fred Hrbek
- MTGA Nutrition Subcommittee- Dick Nelson, George Speers, Jim Halvorson, Gary Johnson, Greg Engelke
- Funding – Minnesota Turkey Research & Promotion Council, Central Bi-Products, ADM, CSC, Minnesota Corn Growers Association, USDA-CSREES Special Research Grant to the Midwest Poultry Consortium