

Feed Ingredients Influence Diet Nutrient Levels

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Nutrient Management



Challenge

➤ Goal

- **Develop cost effective diets that balance animal performance and environmental stewardship**

➤ Influential factors

- **Cost of gain**
- **Feed conversion**



Primary Nutrients of Interest

➤ Nitrogen

- Environmental concern
- Ammonia (NH_3) volatilization

➤ Phosphorous

- Does not volatilize
- Recovered in manure and runoff

Topics

- **Nitrogen and Phosphorous content of common feedstuffs**
- **Effect of feed ingredients on Nitrogen and Phosphorous content of the diet**

Nitrogen Content of Feedstuffs

%, Dry Matter

Feedstuff	Protein	Nitrogen*
Corn	9.8	1.57
Grain Sorghum	12.4	1.98
Corn Silage (35% Grain)	8.6	1.38
Alfalfa Hay (Full Bloom)	17.0	2.72
Soybean Meal (48%)	49.9	7.98
Corn Gluten Feed	23.8	3.81
Corn Distillers Grains	29.7	4.75

Satter et al., 2002 and NRC, 2000

*Nitrogen = Protein/6.25

Phosphorous Content of Feedstuffs

Feedstuff	%, Dry Matter
	Phosphorous
Corn	0.31
Grain Sorghum	0.34
Corn Silage (35% Grain)	0.27
Alfalfa Hay (Full Bloom)	0.24
Soybean Meal (48%)	0.71
Corn Gluten Feed	0.95
Corn Distillers Grains	0.83
Dicalcium Phosphate	19.3

Satter et al., 2002 and NRC, 2000

Conventional Feedlot Finishing Diet

- **80-85% Grain (Corn or Sorghum)**
- **9-13.5% Roughage (Alfalfa or Silage)**
- **Nutrient Composition**
 - **13.34% Crude Protein**
 - **2.13% N**
 - **0.3% P**



“Ethanol Industry”



Distillers Grains in the Feedlot Industry

- **29 out of 31 (83%) nutrition consultants use wet or dried distillers grains in finishing diets**
 - **Represent 18 million animals on feed**
 - **Approximately 69% of cattle on feed**

Feedlot Finishing Diet in the Ethanol Era

- **60-65% Grain (Corn or Sorghum)**
- **15-20% Distiller's grains**
- **Inclusion level**
 - **5-50% (DM basis)**
 - **Most common level = 20%**



Nutrient Composition of WDGS Compared to Corn

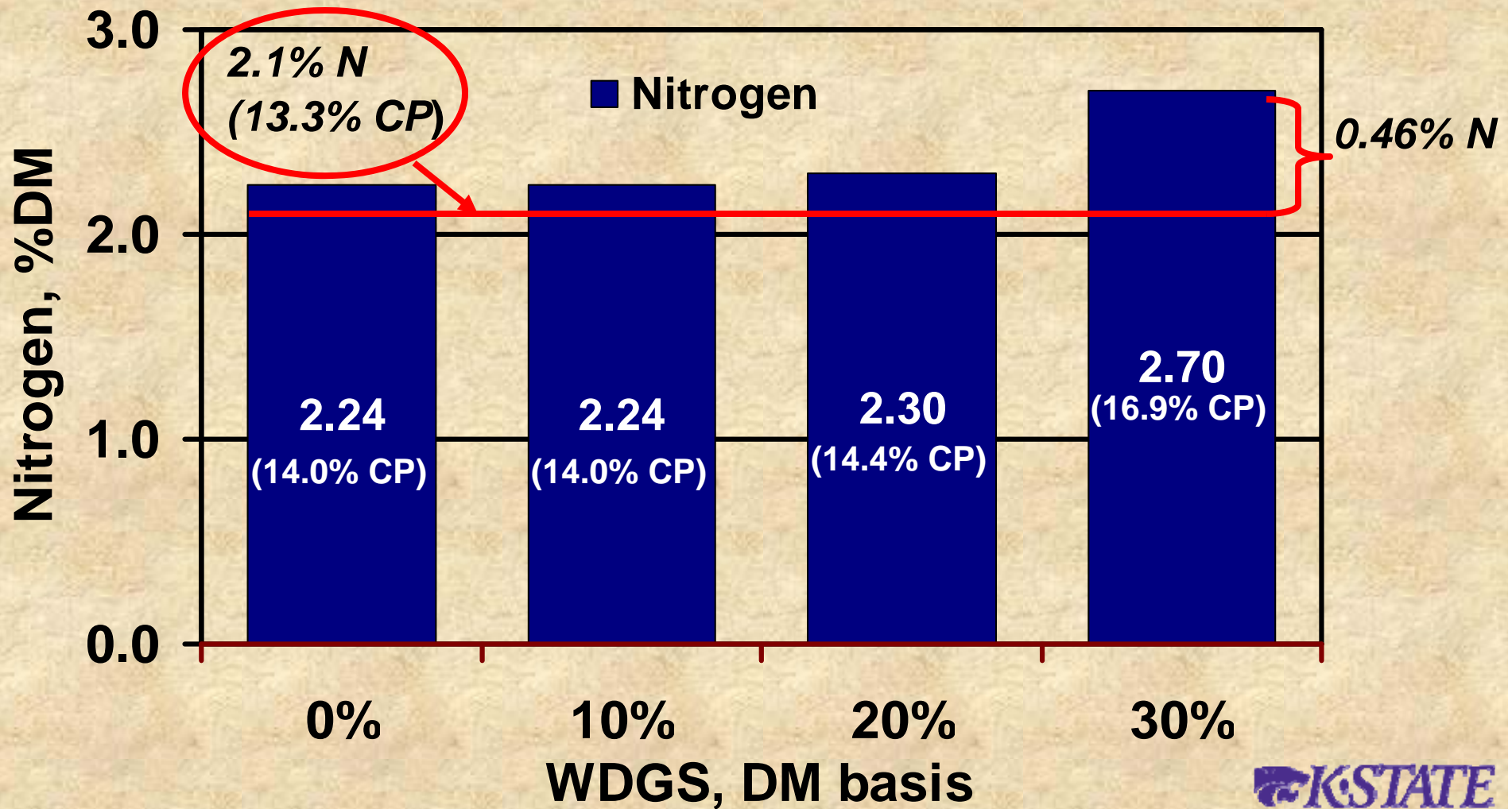
Item	% of DM	
	Corn	WDGS
Crude Protein	9.8	29.7
Nitrogen	1.57	4.75
Phosphorous	0.31	0.83

- Ethanol production converts starch to alcohol and CO₂
- Distillers Grains Contain:
 - 3.0 × more Nitrogen
 - 2.7 × more Phosphorous

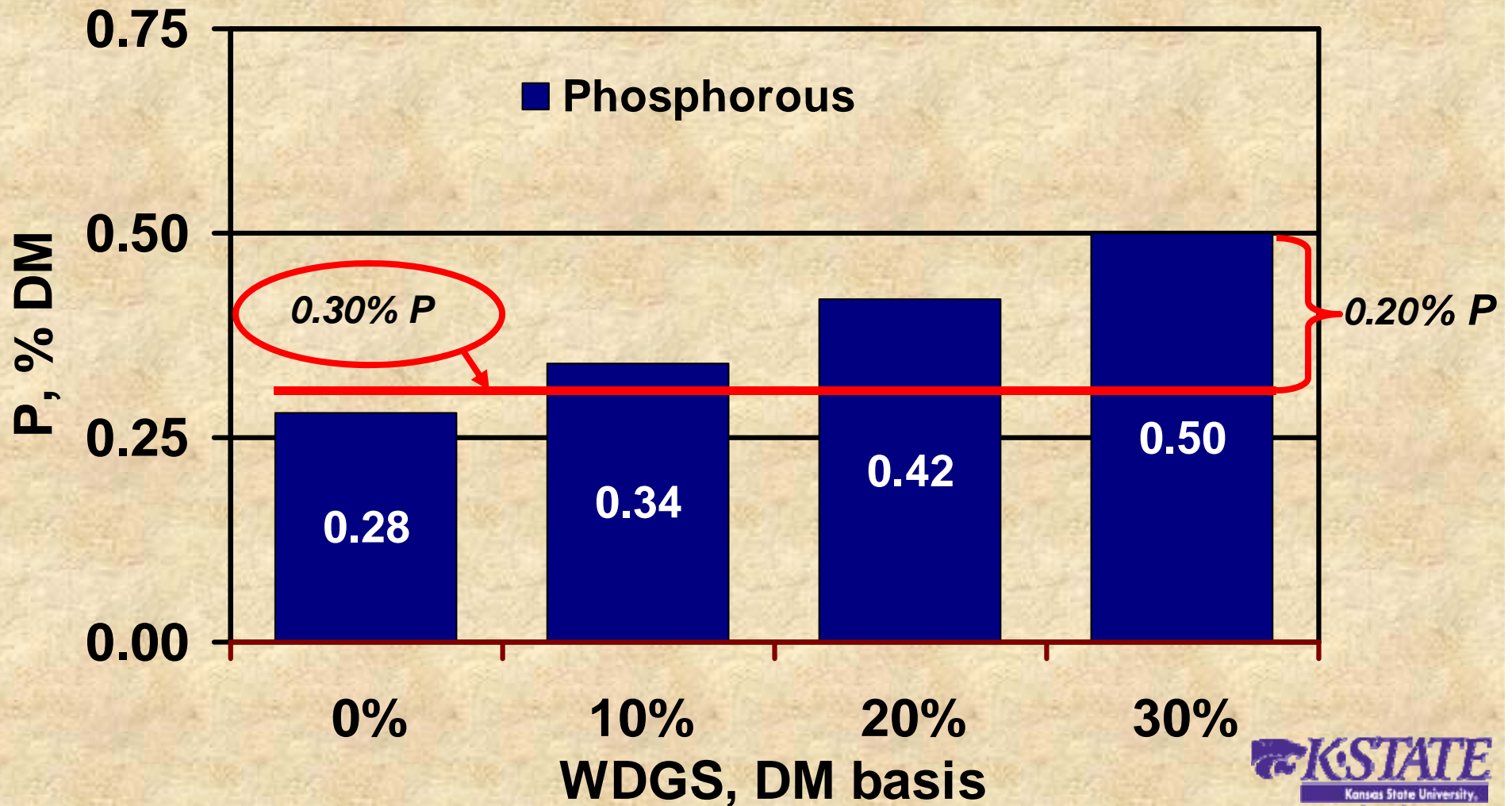
Effect of WDGS Inclusion

Ingredient, % DM	% Wet Distillers Grains			
	0	10	20	30
Steam-Flaked Corn	83.6	78.8	68.9	59.9
Wet Distillers Grains	--	10.0	20.0	30.0
Alfalfa Hay	6.0	6.0	6.0	6.0
Corn Steep	5.0	--	--	--
Rumensin/Tylan Premix	2.23	2.23	2.23	2.23
Supplement	3.42	2.93	1.88	1.88

Effect of WDGS Inclusion on Diet N Concentration



Effect of WDGS Inclusion on Diet Phosphorous Concentration

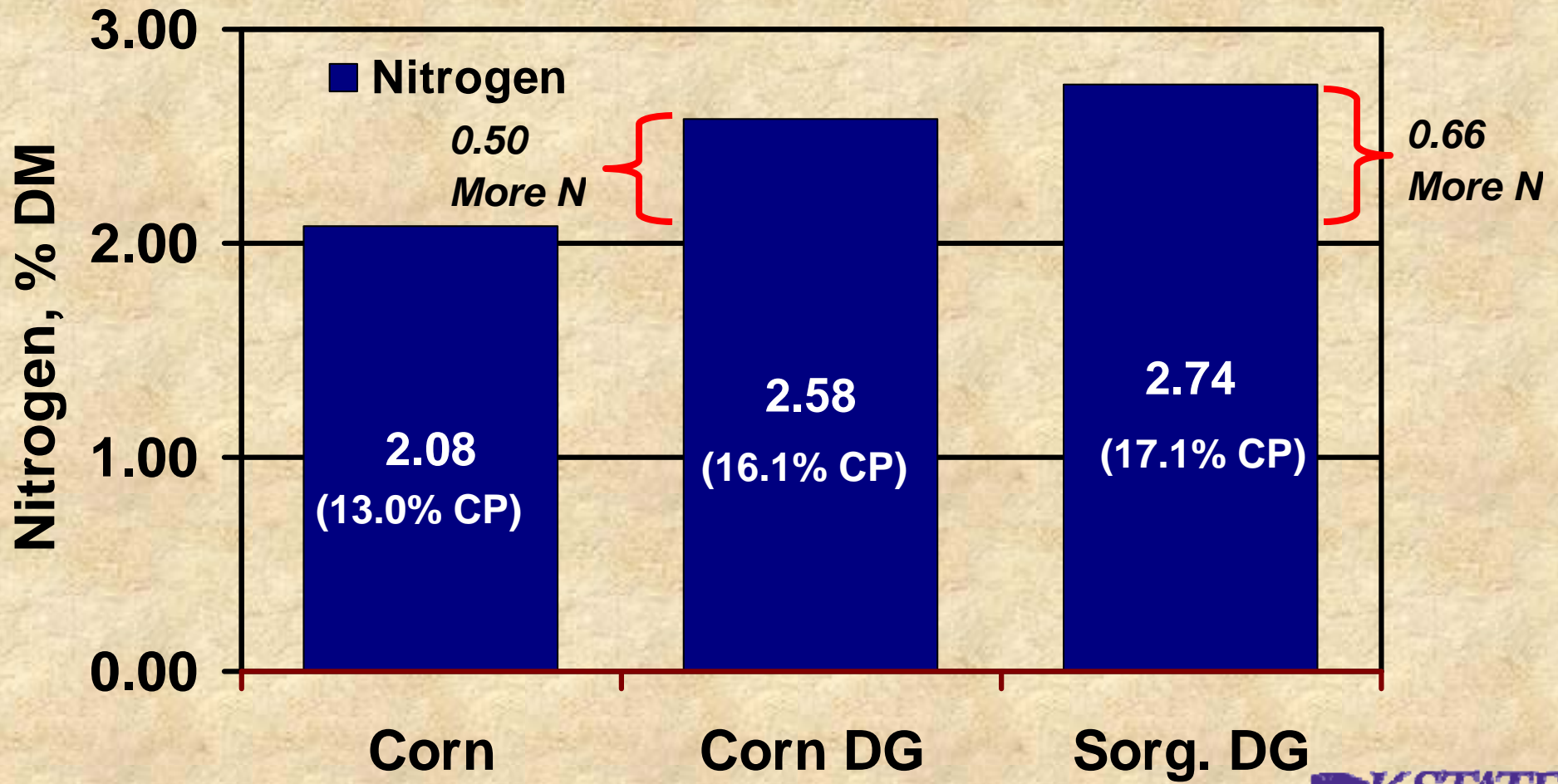


Corn vs. Sorghum Distillers Grains

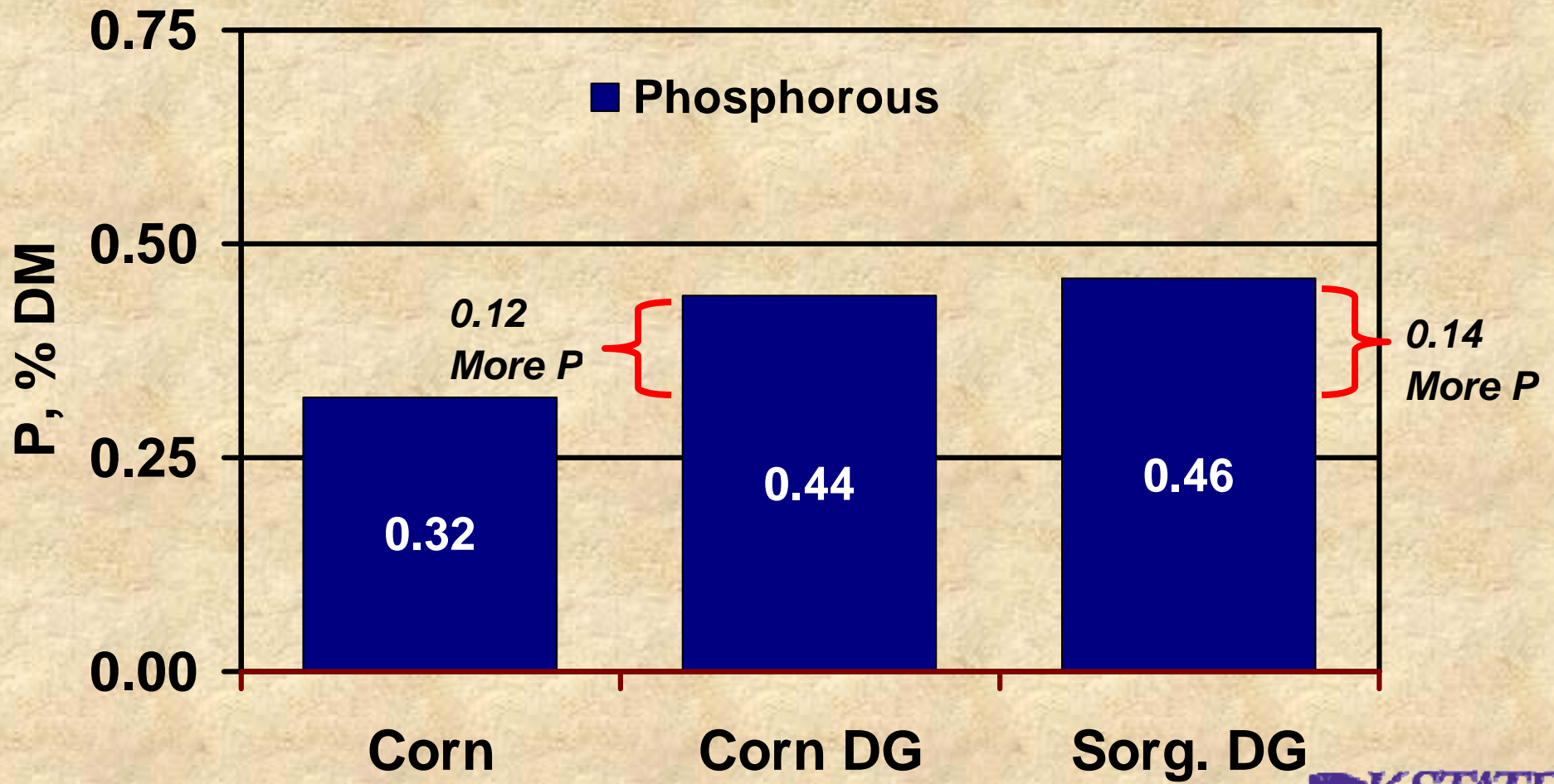
Ingredient, %DM	DRC	Corn DG	Sorg. DG
Dry-Rolled Corn	84.0	54.0	54.0
Corn DG	-	30.0	-
Sorghum DG	-	-	30.0
Alfalfa hay	7.5	7.5	7.5
Molasses	3.5	3.5	3.5
Supplement	5.0	5.0	5.0

Fanning et al., 1999

Corn vs. Sorghum Distillers Grains



Corn vs. Sorghum Distillers Grains



Nutrient Variation in WDGS

➤ By-Product Feedstuff

- Variation due to production process

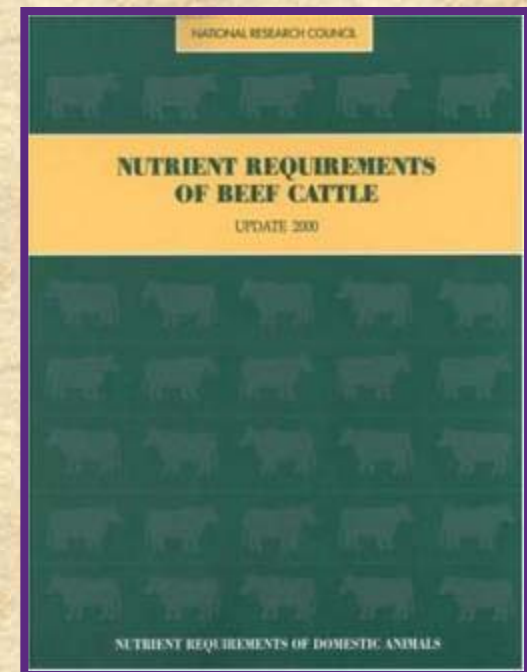
Item*	Average	Min.	Max.
Dry Matter, %	31.9	26.2	37.2
Crude Protein, % DM	31.0	30.6	32.2
Fat, % DM	11.8	7.2	15.3
Phosphorous, % DM	0.84	0.78	0.87
Sulfur, %DM	0.77	0.44	1.72

*Samples obtained from 6 dry milling ethanol plants in NE

Key to Managing the Bunk Side of Nutrient Management!

- **Know what's in the bunk**
 - **Feed analysis**

- **Use book values as a reference**



Take Home Message

“Feedlot diets containing Distiller’s Grains will contain more N and P than conventional corn-based diets”

- **Replacing 1.57% with 4.57% N source**
- **Replacing 0.31% with 0.83% P source**



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