

FEEDING VALUE OF DDGS FOR POULTRY

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Considerations in Feeding DDGS to Poultry

- Product quality and variability
- Amino acid digestibility
- Phosphorus availability
- *Diet levels*
- *Amino acid balance*
- *Metabolizable energy content*
- *Possible source of xanthophylls*
- *Cost in relation to other ingredients*

DDGs in Broiler Chicken Diets

- Early research prior to 1970's
- Levels of 10% (with adjustment of lysine and energy) supported growing performance
- Levels up to 15% in slower growing birds acceptable

DDGs as a Feed Ingredient for Broilers

- Waldroup et al., 1981
 - DDGs level and dietary energy
- Lumpkins, et al., 2003
 - DDGs level
 - High and low density diets
 - Isocaloric and Isonitrogenous

***Performance Response of Broiler Chickens (0-42 days)
to DDGS in Diets Adjusted and Not Adjusted for Energy***

DDGS Inclusion Level (%)	BW (g)		Gain/Feed	
	Fixed Energy	Variable Energy	Fixed Energy	Variable Energy
0	1288	1206	.513	.493
5	1237	1227	.518	.505
10	1237	1203	.508	.490
15	1220	1165	.513	.444*
20	1246	1164	.498	.467
25	1247	1096*	.500	.446*

* Different from control

Waldroup et al, 1981

DDGs and Broilers

Level of DDGs	BW 42d kg	Feed/Gain
0	1.47	1.57
6	1.47	1.56
12	1.45	1.57
18	1.43	1.59

Lumpkins et al., 2003

DDGs in Chicken Layer Diets

- Early research prior to 1970's
- Levels of 10 & 20% comparable production to control
- Levels greater than 20% - reduced egg weight (research levels of 20, 30, and 44%)
 - Amino acid balance?
- Field observations of “dirty” eggs but not in research trials

DDGs and Chicken Layer Diets

- Lumpkins et al (2003)
 - Hy-line W36
 - 22 wk trial
 - Level and diet energy density
- Field trial – Sanfandila (Shurson, 2003)
 - Babcock 300
 - 12 wk trial
 - 10% Norgold DDGs

DDGS and Layer Performance (Lumpkins, et al. 2003)

- Treatments
 - 0 or 15% DDGs
 - Energy density (2870 vs 2800 kcal/kg)
- Interaction of DDGs level & diet energy
- Low energy & 15% DDGs slight depression in egg production (lower protein?)
- No differences in any other egg characteristics

DDGs and Layer Diets Egg Production (%) 22-42 wks

Diet Density	DDGs Level (%)	
	0	15
High	90.2	89.7
Low	89.2	87.6

Sanfandila Field Trial

Performance	Control	Norgold DDGS	P value
EP,%	68.7	72.4	.02
First class EP,%	66.2	68.9	.10
EW/hen/wk, kg	.31	.32	.11
Cull eggs,% of total	2.2	3.5	
Dirty Eggs	1.4	2.2	.002
Yolk color	10.6	10.8	.02

DDGs and Xanthophylls

- Corn 15-25 mg/kg
- Corn Gluten Meal 130-170 mg/kg
- DDGs 15-20 mg/kg
 - SBM replacement in diet

DDGs in Market Turkey Diets

- Early research prior to 1970's – turkey poults to 8 wks
- Levels of 10% similar or improved growth
- Levels of 20% increased feed/gain

Current Market Turkey Research

- Roberson, 2003
 - Hen turkeys – grow/finish diets
 - Isocaloric; digestible amino acids
- Noll ongoing – 3 experiments
 - Tom turkeys – grow/finish diets (8-19 wks)
 - Formulation - isocaloric; digestible amino acids
 - 10% DDGS in 8 wk diet and 8% DDGs at 19 wks

DDGs and Turkey Hen Diets

DDGs %	BW 105 da, kg	F/G 75-105 da
Exp. 1		
0	8.53*	2.99
9	8.41	3.07
18	8.23	3.21
27	8.16	3.21
Exp. 2		
0	8.51	3.44
7	8.46	3.54
10	8.50	3.46

* Significant Linear Component

From: Roberson, 2003

Market Tom Trials (University of Minnesota)

Trial*	Trt	BW, kg	F/G
1	Control	18.9	2.44
	DDGs	19.0	2.48
2	Control	19.2	2.64
	DDGs	19.2	2.65
3	Control	18.4	2.67
	DDGS	18.3	2.63

*Trial weeks of age; 1=5-19 wks; 2=8-19 wks; 3=11-19 wks

Summary - Levels of DDGs

- Chicken layer diets – up to 20%
- Chicken broiler diets – up to 20%
- Market turkey diets – up to 10%

Amino acid balance

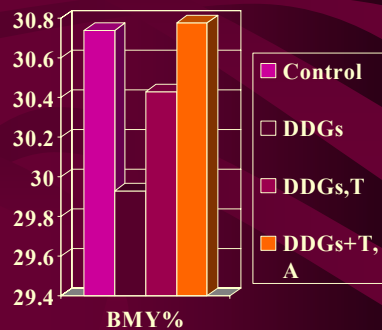
- Lysine – 1st limiting
 - Supplementation with lysine
- Tryptophan and arginine
 - Tryptophan supplementation (expensive)
 - No commercial arginine supplement

Ingredient Amino Acids (% of Protein)

AA	SBM	Corn	MBM	Canola	DDGS
M+C	3.0	4.6	2.4	4.3	4.2
Lys	6.2	3.0	5.4	5.5	2.8
Iso	4.3	3.2	3.0	3.6	3.6
Arg	7.2	5.0	6.7	6.0	4.4
Tryp	1.5	0.9	0.7	1.5	0.8
Thr	4.0	3.5	3.2	4.2	3.8
Val	4.6	4.8	3.8	4.8	4.8

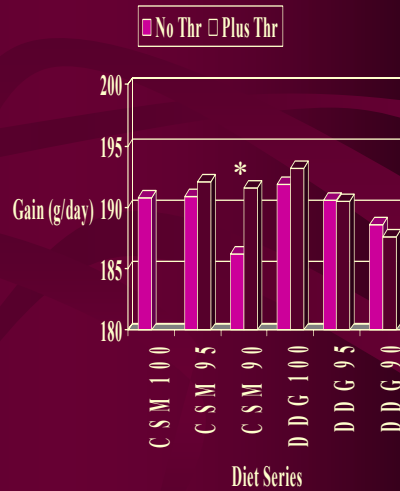
Limiting nature of tryptophan and arginine in DDGs for turkey toms

- Experiment 1
- LP Diets
- supplementation with try alone and in combination with arg increased breast meat yield



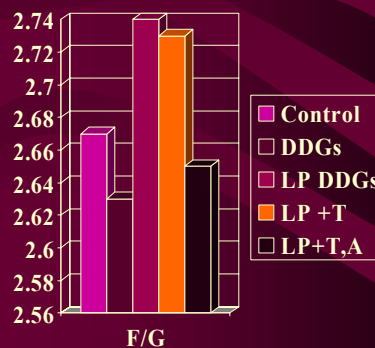
Limiting nature of tryptophan and arginine vs. threonine

- Experiment 2 –
- Lack of threonine response in LP DDGs diet
- Other amino acids limiting?



Limiting nature of tryptophan and arginine in DDGs for turkey toms

- Experiment 3 –
- Lowered protein diet with DDGs resulted in poorer feed conversion – restored with try & arg



Summary

- **Tryptophan and arginine may become limiting as protein levels are reduced.**

Metabolizable Energy

- Poultry NRC 2480 kcal/kg, 9% fat
- Current DDGs – 10-11% fat, 2570 to 2650 kcal/kg
- Potter (1966) 2880 kcal/kg
- Research trials - 2810 to 2850 kcal/kg
- Importance of energy level
 - Feed conversion
 - Least cost formulation for high energy diets

DDGs and Energy Level

DDGs ME Kcal/kg	Fat Cost \$/100 lbs	% DDGs Inclusion \$/100 lbs	DDGs Opportunity Cost, \$/100 lbs	
2810	11	10		
2810	15	10		
2480	11	0	3.82	
2480	15	0	3.34	

Recommendations for Use of DDGs

- High levels of DDGs (to 20%) can be fed to chicken layers and broilers; Turkeys - limit to 10% of diet
- Formulate with minimums for tryptophan and arginine, especially as diet protein is decreased
- Formulate on basis of digestible amino acid content
- ME level of 2750 to 2850 kcal/kg

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Economics and DDGs Quality

Comparison of DDGS Total Amino Acids (Digestible)

%	Hi Dig Lys	Lo Dig Lys
CP	26.4	27.8
Met	.49(.43)	.51(.44)
Cys	.53(.42)	.49(.32)
Lys	.81(.64)	.72(.46)
Thr	1(.82)	1.03(.75)
Tryp	.24(.19)	.2(.16)

Influence of digestible lysine on value of DDGs (\$/cwt)

	High dAA	Low dAA
Corn, 3.10	4.78	4.28
Corn, 3.50	5.00	4.54
Corn, 5.30	6.02	5.70
SBM, 8.25	5.00	4.54
SBM, 8.70	5.21	4.72

Methods/Measurements

- Trial 5-20 wks
- 70 turkeys/trt
- Weights & feed intakes at 8, 11, 14, 17 and 19 wks of age
- Carcass and Meat yield



Poultry Production Changes

- Intensive genetic selection for growth (28# tom at 20 wks vs 40# at 20 wks)
- Marketing of turkey meat products vs traditional RTC



DDGs in Poultry Diets

- Practicality??
- Nutrient Value
- Pricing



Electrolyte Balance

- DDGs
 - Variable in Na
 - Lysine supplementation as HCl form
 - Increases Cl content of diet

Considerations in Feeding DDGS to Poultry

- Product quality and variability
- Amino acid digestibility
- Phosphorus availability
- *Diet levels*
- *Amino acid balance*
- *Metabolizable energy content*
- *Electrolyte balance*
- *Cost in relation to other ingredients*

Concerns with use of DDGS

- **Nutrient variability among sources**
- **Amino acid digestibility**
- **Protein quality - amino acid balance**
- **Fiber content**

DDGs – Broiler Diets (Lumpkins et al., 2003)

- Experiment 1 0 and 15% DDGs at two dietary energy levels (3200 and 3000 kcal/kg – no difference in performance to 18 d
- Experiment 2 – 0, 6, 12, & 18%
 - BW to 42 days similar to 12%
 - Slight depression in BW at 18%

Utilization of CDDGS - Conclusions

- Turkeys responded to declines in dietary protein (thr) with decreased body weight gain and breast meat yield
- Inclusion of DDGs resulted in similar performance as the control corn/soy/meat series
- Response to supplemental thr was dependent on diet series and protein (thr) level