Dried Distiller Grains with Solubles for Swine and Poultry -
Impacts on Nutrient Planning and Manure Management

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Use of DDGS for Monogastics

- Over the past year, use of DDGS has dramatically increased due to price relative to corn and other ingredients
- Barriers to increased use:
  - Higher feeding value in ruminants then monogastric animals
  - Higher feeding inclusion levels in ruminants the monogastrics
    - Reduced performance at high inclusion levels

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Inclusion levels of DDGS for Monogastics

- Swine
  - Nursery 5 to 20%
  - Grow-finish 10 to 20%
  - Gestating sows 5 to 30%
  - Lactating sows 5 to 20%

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Inclusion levels of DDGS for Monogastics

- Poultry
  - Broilers
    - Up to 15%
  - Laying hens
    - Up to 15%
  - Turkeys
    - Up to 15%

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How DDGS impacts monogastric diets

- Nitrogen (Crude protein)
- Phosphorus
- Manure volume

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How DDGS impacts monogastric diets

- Nitrogen (Crude protein – amino acids)
  - DDGS is a very poor lysine source
    - Lysine is the 1st limiting amino acid in swine and typically the 2nd in poultry
  - Therefore, a poor amino acid source relative to the overall crude protein of DDGS causes a total increase in dietary crude protein (nitrogen content)

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Use of Synthetic AA's with DDGS

- Synthetic AA's are a standard in diets for monogastrics
  - Swine – Lysine is the largest used
  - Poultry – Methionine is the largest used
- Vast majority of CAFO producers currently use synthetic AA's in diets
  - Exception in sow breeding herds

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How DDGS impacts monogastric diets

- The increase in dietary crude protein is moderated in DDGS by using higher levels of synthetic lysine
  - 15% DDGS with high synthetics increase diet crude protein ~ 1%.
  - In a 2,400 swine finishing barn, nitrogen excretion would increase from 71,000 to 77,000 lbs per year.
- Air quality impacts of DDGS
  - For every 1% increase in diet CP:
    - Odor and ammonia emission will increase or decrease by 10%. (LPES; Lesson 10)

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How DDGS impacts monogastric diets

- Phosphorus
  - DDGS is a very good phosphorus source
    - High phosphorus content ~ 0.77%
      - Corn = ~ 0.28%
    - High phosphorus availability for monogastrics ~ 77%
      - Corn = ~ 0.14%
  - This combination decreases the level of supplemental dietary phosphorus.

NRC, 1998

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Bioavailability of Phosphorus in Feed Ingredients for Monogastric Animals, %

• DDGS	77	• SBM (46.5%)	23
• Corn	14	• Meat & bone	90*
• Milo	20	• Fish meal	93
• Wheat	50	• Blood meal	92
• Barley	30	• Dried whey	97

NRC, 1998 * High variability

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Use of phytase in mongastric diets

- Phytase is an enzyme that assists in breaking down phytate phosphorus
- For monogastrics, phytase is not produced in the body, thus phosphorus digestion and absorption is very poor.
- Manufactured phytase is now commonly added to monogastric diets
  - Cost effective
- Most CAFO and AFO producers currently use phytase in diets

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How DDGS impacts monogastric diets

- Phosphorus – swine diets
  - 15% DDGS with phytase decreases dietary phosphorus by ~ 0.01%.
    - In a 2,400 swine finishing barn, phosphorus excretion would similar at 11,000 per year.
  - The use of DDGS does not impact land application when used at regular inclusion levels.

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Manure volume Impacts of DDGS

- For every 10% DDGS added to a swine diet:
  - dry matter digestibility decreases 2.2%
  - daily fecal excretion increases 15%
  - Increased manure output when fed DDGS is due to increased fiber content (low digestibility) and reduced amino acid (protein) digestibility compared to corn & SBM

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Nutrient content of manure (lb/year) excreted by 2,400 head of swine fed base diet and base diet containing Phytase and crystalline Lysine (+P/L) and 15 or 30% DDGS.

Item, lb/year	DDGS Inclusion Rate[1]				Book Values	
	Base diet	Base + Phytase & L-Lysine	15% DDGS	30% DDGS	ASAE 2005	NRCS
N Excreted	82,000	71,000	77,000	82,000	65,000	51,000
Crop Available N	59,000	52,000	52,000	60,000		
P Excreted	16,000	11,000	11,000	12,000	11,000	20,000
Crop Available P	16,000	11,000	11,000	12,000		

[1]Phytase and L-Lysine included in 15 and 30% DDGS diets.

Regassa et al., 2008

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Nutrient content of manure (lb/year) excreted by 800,000 a layer farm fed a standard diet and 8 or 16% DDGS.

Item, lb/year	DDGS Inclusion Rate			Book Values	
	0%	8%	16%	ASAE 2005	NRCS
Excreted N	1,250,000	1,260,000	1,270,000	994,000	806,000
Crop Available N	547,000	551,000	556,000		
Excreted P	452,000	475,000	498,000	312,000	301,000
Crop Available P	452,000	475,000	498,000		

Regassa et al., 2008

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DDGS for Swine and Poultry – Take Home

- The use of DDGS in should not significantly affect the NMP/CNMP.
- Planners may need to update their planning tools to reflect farm specific animal performance and feed technologies.
- Book values for manure excretion and typical manure concentrations from five years ago or more are likely to not be representative of current manure production by swine.

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Additional Information

- Impact of Feeding Distillers Grains on Comprehensive Nutrient Management Plans for Swine
- Impact of Feeding Distillers Grains on Comprehensive Nutrient Management Planning for Poultry Layer Production Systems

http://www.heartlandwq.iastate.edu/ManureManagement

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