Recent studies on the use of DDGS in swine diets

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Significant industry issues

- Does feeding DDGS cause Mulberry Heart Disease in weaned pigs?
- What is the impact of oil extraction from DDGS on energy content and economic value?
- Are there antibiotic residues in distillers grains?

Does feeding DDGS diets cause Mulberry Heart Disease in pigs?

- Mulberry heart disease (MHD)
  - Caused by a vitamin E and/or selenium deficiency
  - Field reports indicate prevalence of MHD is increasing
  - Often results in sudden death of the fastest growing pigs
  - DDGS has been implicated as a contributing factor

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Simple steps can help combat MHD in swine

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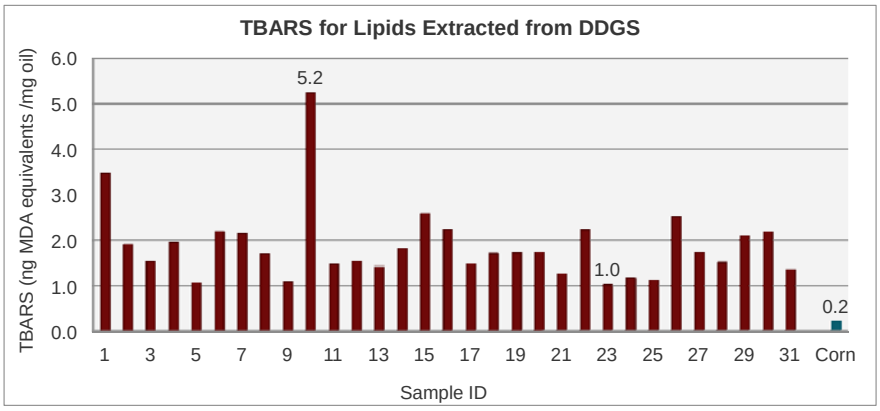
Incidence of Mulberry Heart Disease (MHD), a condition of the heart muscle that often leads to sudden death, has become a growing concern in the pig population. Linked to oxidative imbalance, many in the pig industry point to changes in pig rations – particularly the increased use of DDGS (Distiller's Dried Grains with Solubles) and the threat of more concentrated levels of mycotoxins – as adding fuel to this culprit's fire.

Is there a connection between MHD and DDGS?

- Requirement for vitamin E may increase with increasing polyunsaturated fatty acids (PUFA) in the diet
  - PUFA are highly susceptible to oxidation
  - DDGS contain high levels of PUFA, especially linoleic acid (~60%)
  - Some DDGS sources contain high levels of oxidized oil
- Requirement for Se may increase with increasing sulfur in diet
  - Sulfur interferes with Se utilization
  - Some DDGS sources contain high levels of sulfur

Lipid oxidation (TBARS) of 31 DDGS sources

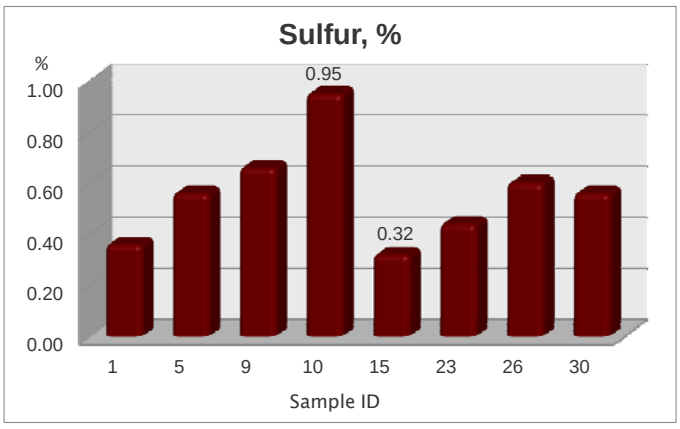
- TBARS values for 31 DDGS samples ranged from 1.0 to 5.2 ng MDA equivalents/mg oil.
  - Highest TBARS value among DDGS samples was **25X >** reference corn sample (0.2 ng MDA equivalents/mg oil).

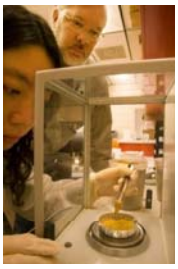


(Song et al., 2011)

Sulfur content varies among DDGS sources

- Sulfur content of 8 DDGS samples ranged from 0.32 to 0.95%.





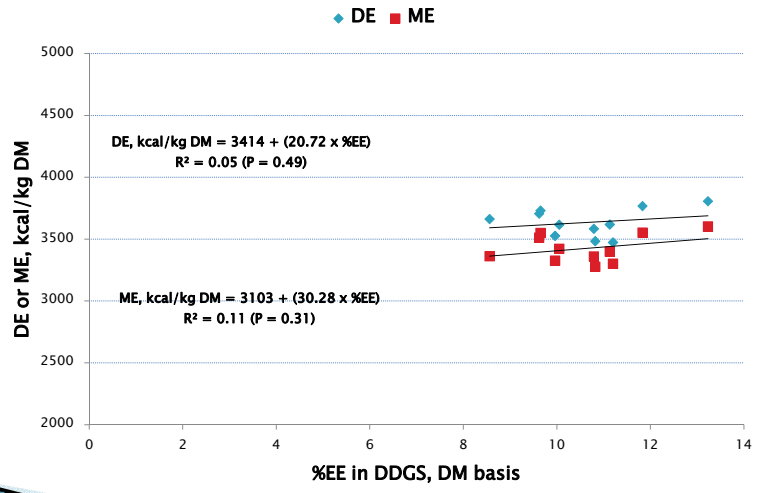
(Song et al., 2011)

Conclusions

- Feeding high levels of DDGS to pigs & sows **DID NOT result in MHD**
- Dietary inclusion of DDGS to sows reduces milk vitamin E and Se concentration
  - Sow milk vitamin E & Se content impacts pig antioxidant status
  - Effect did not persist post-weaning
- Supplementing 5x NRC vitamin E in nursery diets improved pig antioxidant status

What is the effect of oil extraction on ME content of DDGS for swine?

Relationship between crude fat (EE) content of DDGS and DE and ME content is poor



We can't use crude fat to estimate ME content!!

DDGS Source	DDGS Source 11	DDGS Source 9	DDGS Source 8	DDGS Source 5
ME, kcal/kg	3,553	3,550	3,603	3,277
Crude fat, %	11.8	9.7	13.2	11.1
Starch, %	1.1	2.8	1.3	0.9
NDF, %	38.9	28.8	34.0	39.7
Crude protein, %	32.1	29.8	30.6	31.6
Ash, %	4.9	5.0	5.3	5.0

A reduction in crude fat **DID NOT** increase NDF and TDF.

Comparing DDGS Source 11 vs. 9:
2.1 percentage unit decrease in fat reduced ME by **3** kcal/kg
Comparing DDGS Source 8 vs. 5:
2.1 percentage unit decrease in fat reduced ME by **326** kcal/kg

ME prediction equations for reduced-oil DDGS

(1) ME kcal/kg DM = 4,548 – (49.7 x % TDF) + (52.1 x % EE)

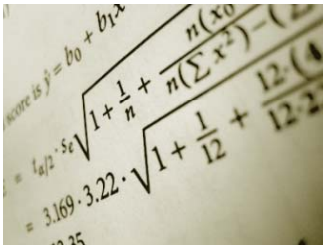
SE = 49 R^2 = 0.85

(2) ME kcal/kg DM = 3,711 – (21.9 x % NDF) + (48.7 x % EE)

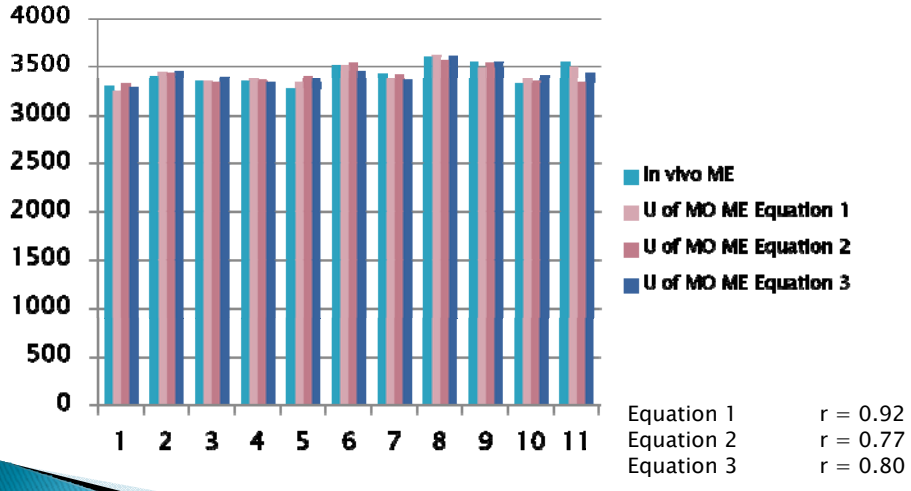
SE = 75 R^2 = 0.65

(3) ME kcal/kg DM = 4,132 – (57.0 x % ADF)

SE = 76 R^2 = 0.59



Comparison of actual vs. predicted ME content of DDGS



Equation 1 r = 0.92
Equation 2 r = 0.77
Equation 3 r = 0.80