Effect of Corn Distiller’s Dried Grains with Solubles (DDGS) and/or Antimicrobial Regimen on the Ability of Growing Pigs to Resist a Lawsonia intracellularis Challenge

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DDGS and Gut Health

• Field reports:
  – Beneficial effect of adding 5 to 10% DDGS in grow-finish diets
• DDGS contains low levels of soluble (0.7 %) and high levels of insoluble (42.2 %) fiber (Shurson et al., 2000)
  – Low soluble fiber diets may reduce the proliferation of pathogenic organisms in the GI tract (Hampson, 1999).
• DDGS contains yeast cells
  – May have nutraceutical properties

Objective - Experiment 1

• Determine if dietary DDGS inclusion at 10 or 20% of the diet reduces the incidence or severity of ileitis in pigs infected with Lawsonia intracellularis
Methodology – Experiment 1

• Pigs:
  - Weaned at 17 d of age
  - Blocked by gender and weight
  - Fed experimental diets for 7 weeks

• Dietary treatments:
  - NC: Negative control, corn-soybean meal diet
  - PC: Positive control, corn-soybean meal diet*
  - D10: 10% DDGS diet*
  - D20: 20% DDGS diet*
    • Diets formulated to contain: 3390 kcal/kg ME, 1.15% AID lysine, 0.65% AID methionine & cystine, 0.80% Ca, and 0.70% P

Methodology – Experiment 1

• Statistical analysis:
  - Utilized the GLM procedure of SAS (ANOVA and LSMeans)
  - Compared NC and PC treatments (effect of challenge)
  - Analyzed within challenged groups (effect of diet)
  - Individual pig = experimental unit

Effect of Dietary DDGS Level on Lesion Length, d 21 Post-Challenge, Exp. 1

** Means not sharing a common superscript letter are different (P < .05).
* Effect of disease challenge (P < .05).

Effect of Dietary DDGS Level on Lesion Severity, d 21 Post-Challenge, Exp. 1

** Means not sharing a common superscript letter are different (P < .05).
* Effect of disease challenge (P < .01).

Effect of Dietary DDGS Level on Lesion Prevalence, d 21 Post-Challenge, Exp. 1

** Means not sharing a common superscript letter are different (P < .05).
* Effect of disease challenge (P < .01).
Effect of Dietary DDGS Level on Fecal Shedding (PCR Analysis), Exp. 1

<table>
<thead>
<tr>
<th>% of pigs</th>
<th>d 0</th>
<th>d 14*</th>
<th>d 21*</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>D10</td>
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<tr>
<td>D20</td>
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</tbody>
</table>

**Means not sharing a common superscript letter are different (P < .05).**

* Effect of disease challenge (P < .01).

Effect of DDGS Level on *L. intracellularis* Infection (IHC Analysis), Exp. 1

<table>
<thead>
<tr>
<th>IHC Score*</th>
<th>NC</th>
<th>PC</th>
<th>D10</th>
<th>D20</th>
</tr>
</thead>
<tbody>
<tr>
<td>IHC Score*</td>
<td></td>
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</tbody>
</table>

**Means not sharing a common superscript letter are different (P < .05).**

* Effect of disease challenge (P < .01).

Summary of Results – Exp. 1

- DDGS inclusion did not improve the pig’s ability to resist an ileitis challenge
- Dosage (inoculation) rate was higher than desired
  - Actual: 1.56 x 10^9 dose of *L. intracellularis*
  - Goal: 1 x 10^8 dose of *L. intracellularis*

Objectives - Experiment 2

- Determine if dietary DDGS inclusion can reduce the incidence or severity of ileitis in pigs infected with *Lawsonia intracellularis*
- Compare feeding a 10% DDGS diet to a currently approved antimicrobial regimen for ileitis

Methodology - Experiment 2

- Dietary treatments:
  - NC: Negative control corn-soybean meal diet, no antimicrobial
  - PC: Positive control corn-soybean meal diet, no antimicrobial*
  - D10: 10% DDGS diet, no antimicrobial*
  - PC+AR: Control diet with antimicrobial regimen*
  - D10+AR: DDGS diet with antimicrobial regimen*

- Antimicrobial regimen (AR):
  - Bacitracin Methylene Disalicylate (BMD®)
  - Chlorotetraycline (Aureomycin®)

- Statistical analysis:
  - Compared NC and PC treatments (effect of challenge)
  - Factorial (2x2) arrangement of challenged treatments

Effect of Dietary Treatment on Lesion Length, d 21 Post-Challenge, Exp. 2

<table>
<thead>
<tr>
<th>Lesion length, cm</th>
<th>Jejunum*</th>
<th>Ileum*</th>
<th>Cecum*</th>
<th>Colon*</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td></td>
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</tr>
<tr>
<td>PC</td>
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</tr>
<tr>
<td>D10</td>
<td></td>
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<td></td>
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<tr>
<td>D10+AR</td>
<td></td>
<td></td>
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</tbody>
</table>

**Effect of disease challenge (P < .01).**
**Effect of Dietary Treatment on Lesion Severity, d 21 Post-Challenge, Exp. 2**

![Graph showing lesion score distribution across sections of the gastro-intestinal tract for different dietary treatments.](image)

- * Effect of disease challenge ($P < .01$).

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**Effect of Dietary Treatment on Lesion Prevalence, d 21 Post-Challenge, Exp. 2**

![Graph showing lesion prevalence across sections of the gastro-intestinal tract for different dietary treatments.](image)

- * Effect of disease challenge ($P < .01$).

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**Effect of Dietary Treatment on Fecal Shedding (PCR Analysis), Exp. 2**

![Graph showing PCR analysis results for different dietary treatments.](image)

- * Effect of disease challenge ($P < .01$).

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**Effect of Treatment on *L. intracellularis* Infection (IHC Analysis), Exp. 2**

![Graph showing IHC analysis results for different treatments.](image)

- * Effect of disease challenge ($P < .01$).

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**Summary of Results, Exp. 2**

- Inoculation level was closer to goal
- DDGS inclusion (10%) or antimicrobial regimen had a positive effect on the pig’s ability to resist an ileitis challenge
- No beneficial additive effects of combining DDGS and BMD®/Aureomycin® regimen

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**Implications**

- Dietary inclusion of DDGS
  - May provide some benefit during moderate ileitis challenge
  - May not provide a detectable benefit during a severe ileitis challenge
Acknowledgement

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Midwest DDGS Association
Alpharma

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