Comparison of Hormel Amino Acid Premix with Hormel 543NL Swine Premix

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The purpose of this test is to compare a grow-finish swine premix that utilizes a synthetic amino acid profile to a vitamin/trace mineral premix more commonly used in the swine industry today. Phosphorous and nitrogen in animal waste is becoming an environmental concern when relating to livestock manure management, because of the association of excess nutrient loads in soil. Science is attempting to identify solutions to excess nutrients in waste and assist farmers in controlling these and other nutrients to eliminate excess loading of the soil. We looked for ways to lower these levels while trying to keep the carcass characteristics equal. We found no difference between the regular premix with higher protein levels and the AA premix with about 2% lower protein values for various carcass characteristics. By correcting the AA premix we were able to even the back fat out. We feel this premix will be advantageous to nutrient management.

Background of Project:

The University of Wisconsin – Platteville signed a two-year research agreement with Hormel – Feed Division to facilitate production based research projects at the new Swine Center housed at the Pioneer Farm. I am the lead student employee at the facility and was and will be involved with all the projects that will be done at the farm.

Purpose of Project:

Phosphorous and nitrogen in animal waste is becoming more of an environmental concern when relating to livestock operations and waste management. These nutrients are associated with odor as well as excess nutrient loads in soil and most states are looking to try to index the level of these nutrients when they are land applied. Science is attempting to identify solutions to excess nutrients in waste and assist farmers in controlling these and other nutrients not only to eliminate excess loading of the soil but to
also control odor associated with livestock facilities. The feed division of Hormel is interested in attempting to find new ways to assist their customers with these environmental issues.

**Research Objectives:**

The purpose of this test is to compare a grow-finish swine premix that utilizes a number of concepts that are considered environmentally friendly, including the use of synthetic amino acids and phytase to reduce nitrogen and phosphorous levels that are actually fed to a vitamin/trace mineral premix more commonly used in the swine industry today.

**Materials & Methods:**

The test group was a group of 80 pigs which were weighed onto the trial at about 50# then they will be fed the Grow-Finish Phase 1 diet. The pigs were weighed every 14 days through the course of the trial more specifically to determine when they should be shifted to the Grow-Finish Phase 2 diet, which should occur at about 125#. The pigs will then be weighed off test when they reach harvest weight of about 265#. Each pig will randomly be assigned a treatment with consideration being given to standardizing pens for litter, sex and weight. Pigs will be weighed individually and feed weights will be measured per feeder where each feeder is shared by 2 pens.

Hormel provided the feed ingredients and diet formulations as well as scales for weighing all both animals and feed. In addition, these pigs were transported to Austin, MN to the Hormel slaughter facility for carcass measurements. I made one trip to Austin to view the equipment used in tracking the animals and taking carcass measurements.
While the Hormel project will require 3 replicates of 80 animals, I only had time to complete one. I am also working with the other projects at this current time.

In addition, manure samples and readings were also taken to measure specific amounts of nitrogen and phosphorus levels.

**How to measure backfat**

Backfat is a very important measurement when looking at the quality of a carcass. These readings were taken to compare the carcasses of the animals that were on the Amino Acid feed to those that were on the traditional feed. To begin the backfat measurements, the carcass must be ribbed. This is accomplished by cutting near the junction of the 10th and 11th thoracic vertebrae with a ribbing saw. The cut should be made perpendicular to the length of carcass just below the 11th rib. Then use a knife to cut perpendicular across the long axis of rib eye, without cutting into the belly. Using a backfat probe or other instrument graduated in 1/10 inch increments, measure the fat depth including the skin at the ¾ point over the rib eye. Do this by dividing the loin eye muscle into quarters, measure the fat depth at ¾ point to the outer edge perpendicular to the skin. This measurement was taken of all of the hogs that were on the test and were averaged to find the average backfats of the treatment and the control hogs.

**Backfat & Percent Lean Averages**

<table>
<thead>
<tr>
<th>WF1</th>
<th>% Lean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backfat</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>54.86</td>
</tr>
<tr>
<td>Treatment</td>
<td>55.18</td>
</tr>
<tr>
<td>.68</td>
<td></td>
</tr>
<tr>
<td>.69</td>
<td></td>
</tr>
<tr>
<td>——49 pigs in control</td>
<td></td>
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</tbody>
</table>
As you can see the backfat in WF1 and WF4 are very similar between the control and the treatment groups. There was a slight difference however in the amount of backfat from WF1 and WF4, these differences are associated with the different genetic lines that were used in the two groups of hogs. Also, the percent lean, which is the total amount of muscle in the carcass, are also very similar. Overall we feel that there was no significant difference in the carcasses of the control and the treatment on the two groups of pigs.

**Wean- Finish 1**

- Control
  - Average Daily Feed Efficiency • 5.82
  - Average Daily Gain • 1.81
  - Pounds of Feed per # of gain • 3.22
  - Average Days to Market • 104.8
- Treatment
  - Average Daily Feed Efficiency • 5.97
  - Average Daily Gain • 1.78
  - Pounds of Feed per # of gain • 3.36
  - Average Days to Market • 104.6

- 49 pigs in control
- 48 pigs in treatment

**Wean- Finish 4**

- Control
  - Average Daily Feed Efficiency • 6.16
  - Average Daily Gain • 1.99
  - Pounds of Feed per # of gain • 3.10
  - Average Days to Market
- Treatment
  - Average Daily Feed Efficiency • 6.00
  - Average Daily Gain • 1.91
  - Pounds of Feed per # of gain

- 50 pigs in control
- 53 pigs in treatment
Feed Analysis

In the growth analysis of WF1 and WF4, there does not seem to much of a difference in either WF1 or WF4 in Average Daily Gain or Pounds of feed per pound of gain. Both sets of data seem to be very close and do not seem to have a huge impact on the outcome of the carcass characteristics of the pigs. However, the Average Daily Feed Efficiency seems to be a bit higher in the treatment group. This means that the amount of feed that is fed to each pound of gain is a little higher. Although this number is slightly higher, I feel that the gains that are being made in decreasing the amounts of Nitrogen and Phosphorus in the manure we feel that the amino acid (treatment) feed would have a positive impact for the farmer.

What we expect?

We expect that the amounts of nitrogen and phosphorus to decrease due to the change in the Amino Acid profile of the premix. By changing the amino acid profile, the nitrogen levels in the manure should decrease. Also, by adding Phytase to the premix it will help the pig break down the available phosphorus in the corn, this is an advantage because you will not have to add supplemental phosphorus, lowering the overall amount of phosphorus that is used in the diet.

Manure Analysis
<table>
<thead>
<tr>
<th></th>
<th>WF1 Control</th>
<th>WF1 Trt.</th>
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<th>WF1 Control</th>
<th>WF1 Trt.</th>
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<th>WF1 Control</th>
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<th>WF1 Trt.</th>
<th>WF1 Trt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>79.9</td>
<td>77.2</td>
<td>77</td>
<td>82.5</td>
<td>82.9</td>
<td>85.4</td>
<td>85.4</td>
<td>85.4</td>
<td>85.4</td>
<td>85.4</td>
</tr>
<tr>
<td>D.M.</td>
<td>20.1</td>
<td>28.8</td>
<td>23</td>
<td>17.5</td>
<td>17.1</td>
<td>14.6</td>
<td>14.6</td>
<td>14.6</td>
<td>14.6</td>
<td>14.6</td>
</tr>
<tr>
<td>Total N</td>
<td>100.1</td>
<td>107.87</td>
<td>106.9</td>
<td>100.2</td>
<td>99.35</td>
<td>96.64</td>
<td>93.31</td>
<td>93.31</td>
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<tr>
<td>Total P</td>
<td>68</td>
<td>53.74</td>
<td>72.57</td>
<td>58.54</td>
<td>52.65</td>
<td>41.63</td>
<td>42.74</td>
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<tr>
<td>Total K</td>
<td>53.45</td>
<td>57.68</td>
<td>57.73</td>
<td>48.11</td>
<td>50.92</td>
<td>46.82</td>
<td>58.57</td>
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Table 1.1  Manure Analysis in pounds per ton

In the data in Table 1.1, we feel that the numbers that we received in WF1 may have been wrong. Due to some of the collection methods that were used, we feel that there was some human error in either the collection or the labeling of the samples; therefore we took most of the information from WF4. In WF4, you can see the pounds of nitrogen and phosphorus levels have decreased.

**Nitrogen and Phosphorus**

In the statistical analysis, the Nitrogen and Phosphorus seem to not to have a significant variation. However, in terms of the total amount decrease in nitrogen and phosphorus in the manure, we feel that any considerable decrease in these levels. We feel that this feed would serve as a real advantage to the farmer.

**Conclusion**

Overall there were no carcass differences between the 543NL premix with the higher protein levels and the Amino Acid premix with about 2% lower protein values. We look for this premix to be very advantageous as farmers are forced to monitor
Nitrogen and Phosphorus levels in the manure that goes back onto the field. UWP has chosen to use the AA Premix as our main premix in our rations.