



Opportunities for Micro-Aid® in Diets Containing Distillers Dried Grains with Solubles (DDGS)

Introduction

The continued expansion of ethanol production as a renewable energy fuel has altered the landscape of both grain usage and livestock nutrition in the United States. Specifically in the livestock sector, the availability of byproducts from the distillery industries such as distillers dried grains with solubles (DDGS), condensed distillers solubles, corn gluten feed, and corn gluten meal is rapidly increasing.

For many years, significant variation in quality and nutritional value of DDGS limited its use to primarily in ruminant feeds. However, advancements in the production process have improved the quality and consistency of DDGS that are currently available so that it has been successfully included in feeds for swine, poultry, aquaculture, and companion animals. The use of DDGS in animal feeds will continue to increase in proportion with its expanding availability.

Three main considerations must be taken into account when formulating DDGS into the ration. Although it has a protein content greater than 25%, the amino acid balance is poor. Thus, use in monogastric rations may require synthetic amino acid supplementation, especially lysine, methionine, or tryptophan. The concern over its high protein content is true for dairy rations as well. Replacing corn with DDGS will make it very difficult to formulate lactating rations below 18% crude protein. The second concern is that because the ethanol production process increases the concentration of nutrients in DDGS approximately three-fold compared with the original values found in corn, the phosphorus content must also be taken into account. Producers need to consider how their nutrient management plans will be affected. Increases in dietary phosphorus concentration from DDGS inclusion will lead to increased fecal phosphorus excretion. A final trepidation that producers need to account for when feeding DDGS is the effects that it will have on their waste storage systems. Because the inclusion of these byproducts will increase the dietary fiber content, there will be an alteration in pit composition (i.e., increased fiber results in increased manure excreted and subsequent increased solids in waste systems). As a result, a management tool such as Micro-Aid® that will help alleviate solids buildup in waste storage systems will be needed.

Table 1. Summary of Research Experiments with Micro-Aid® for Reducing Ammonia

Research Experiment	Ammonia Reduction, %
Animal Industry Research Inst., Miaoli	48.0
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National Institute of Ag. Eng., Bygholm	29.0
Purdue University	55.6
Kangweon National University	49.0
Wilmington College	41.6
University of Illinois	42.3
University of Illinois	13.0
University of Iowa	43.0
Wayne Feeds	34.0
Simonsen Laboratories, Inc.	99.0
Texas A & M University	70.0
Texas A & M University	45.0
University of Minnesota	52.0
Overall Reduction in Ammonia =	46.4%



Micro-Aid® in all feed, all the time





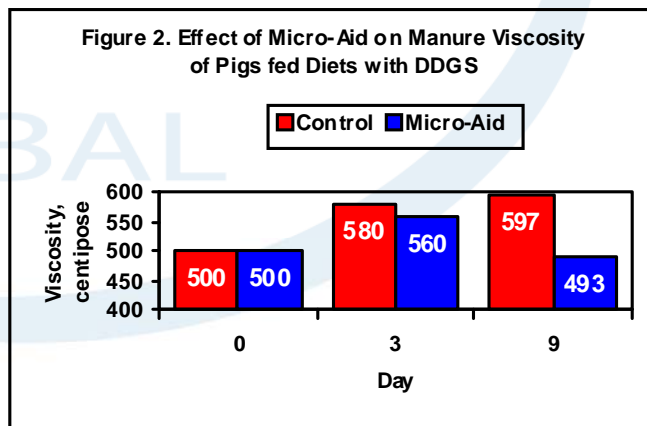
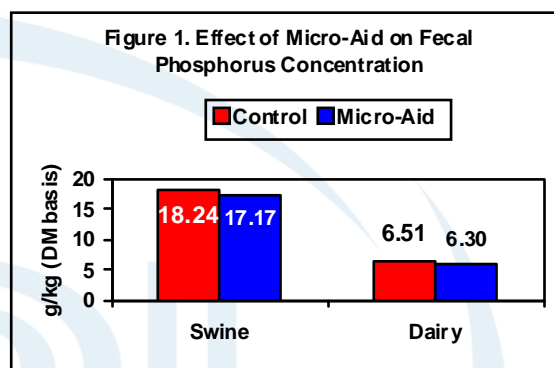
Micro-Aid®

Micro-Aid® is an all natural technology that is safe for use in all livestock and poultry. Micro-Aid® works enterically to promote a healthier environment and elicit benefits. As well, it is not absorbed in the gastrointestinal tract; but, is excreted along with fecal matter to continue working in the waste management system. The following discussion of research studies demonstrates the opportunity for Micro-Aid® to alleviate the concerns with feeding DDGS.

Overfeeding of dietary protein will result in inefficient nitrogen utilization and subsequent increased ammonia generation. Extensive research with Micro-Aid® proves the environmental benefits of reduced ammonia and other noxious gases (Table 1). This enhanced air quality promotes better animal health and improved performance, reduced stress and discomfort, and improved environment for the health and welfare of animals and workers alike.

As shown in Figure 1, research in both dairy and swine demonstrates the ability of Micro-Aid® to reduce fecal phosphorus concentration. Again, the high phosphorus content of DDGS can lead to increased fecal phosphorus excretion. Thus, an approximate 6% reduction in fecal phosphorus of swine and 3% of dairy will benefit a producer's nutrient management plan when accounting for phosphorus application. Specific research results evaluating the effects of Micro-Aid® on manure of pigs fed diets supplemented with DDGS are presented in Figure 2. This evaluation collected manure from pigs fed diets containing DDGS and placed them into an in vitro model that simulated a pit environment. Initial (day 0) manure viscosity values are representative of a pit that would require significant agitation during pump-out (greater than 300 cps).

Manure viscosity was reduced 3.5% by day 3 in the Micro-Aid® treatment compared with the Control. Then, by day 9, the viscosity of manure from pigs fed high fiber DDGS diets was reduced ($P < 0.001$) by 17% in the Micro-Aid® treatment compared with the Control. This significant reduction in manure viscosity after only 9 days of storage allows for better waste management by the producer when higher fiber diets are being utilized. Economic savings for the producer can be obtained from reduced energy costs required to pump-out the manure storage system or from greater pump-out of manure storage, allowing for more total storage space.



Micro-Aid® in all feed, all the time





Research in ruminant animals also supports the efficacy of Micro-Aid® in high fiber diets. Supplementing Micro-Aid® to lactating dairy cow rations increased acid detergent fiber (ADF) digestion by 7.4% (Figure 3). Similar research also reported stimulation in fiber digesting bacteria as evidenced by a reduction of RNA-N as a percentage of Microbial N in the Micro-Aid® treatment vs. the Control (Figure 4). Fiber digesting bacteria are known to be more efficient than starch digesting bacteria and, thus, help to reduce solids.

Key Technical Points

- The availability and utilization of DDGS in the livestock and poultry industries will increase in future years as a result of increased ethanol production.
- Concerns with formulating DDGS into rations include high protein content with poor amino acid balance resulting in increased ammonia, higher phosphorus excretion, and high fiber content resulting in increased manure solids.
- Feeding Micro-Aid® in diets containing DDGS effectively reduces each of these concerns through improved nutrient utilization, nitrogen efficiency, fiber digestion, and reduced waste management cost.

Figure 3. Effect of Micro-Aid on ADF Digestion of Lactating Dairy Cows

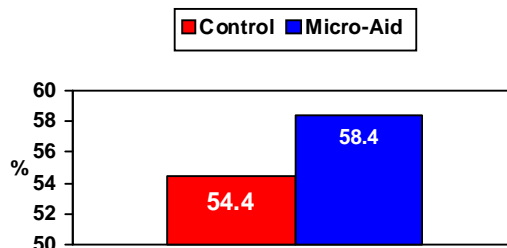
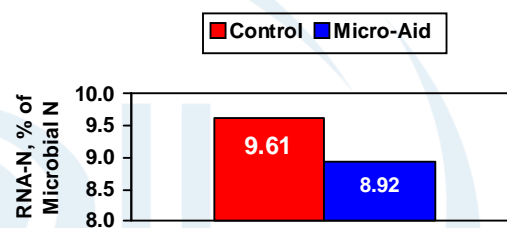


Figure 4. Effect of Micro-Aid on RNA-N as a Percent of Microbial N - (Indication of Fiber-Digesting Bacteria Growth)



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