

ETHANOL

EDGE

Phibro
Ethanol Performance Group

June 2009 Issue: 3

SULFUR AND DISTILLERS GRAINS (DGs)

Contaminants in a plant's distillers grains (DGs) can impact a customer's profitability in many ways, especially when it comes to sulfur. In today's market place, maximizing the value of distillers co-products has never been more important. Customers must feel confident that they are consuming safe DGs, which provide a cost-effective feed source for their livestock. Excess sulfur can decrease rate of gain, or even cause serious illness such as polio. Such results can cause major damage to a plant's reputation, ultimately reducing the price the company can command for its DGs.

Sulfur is an essential macro-mineral for all livestock species. It is contained in essential amino acids such as methionine and cystine and also found in the B-vitamins - thiamine and biotin. While sulfur at small doses is an important nutrient, excessive amounts of this essential nutrient are a concern in all species, especially ruminants. Sulfur at high levels can cause a decrease in the rate of weight gain and at worst, it may cause Polioencephalomalacia (PEM), commonly known as polio, which can lead to death.

The 2005 National Research Council (NRC) guidelines recommend a 0.3 percent total of dietary sulfur on a dry matter basis for livestock, such as feed lot cattle, consuming high concentrate rations. It also recommends 0.5 percent total dietary sulfur on a dry matter basis for livestock, such as beef cows, consuming forage-based rations. Sulfur can come from the following sources:

- Distillers grains;
- Water supply; and
- Other feed additives.

Ethanol producers can improve the marketability of their DGs by consciously trying to minimize sulfur additions whenever possible. Sulfur builds up in DGs due to an additive effect associated with typical processing practices. Corn contains about 0.12 percent sulfur. The addition of other sulfur-containing compounds can quickly elevate the sulfur content of DGs. Yeast will also add to the amount of sulfur in the DGs.

"DGs can be high in sulfur because of an additive effect," explains James Chapman, Ph.D., dairy technology manager for Prince Agri Products Inc. Several chemicals are utilized during typical ethanol production processes which all contribute to higher sulfur levels in the finished product. The recycling and reuse of water streams within these plants may increase the sulfur concentration by as much as 300 percent.

The following chemicals are major culprits in elevated sulfur concentrations in finished products:

1. Sulfuric acid;
2. Cleaning acids (sulfamic acid or sodium bisulfate); and
3. Sodium bisulfite used in ethanol CO₂ scrubbers.

SULFURIC ACID

Sulfuric acid is the largest non-naturally occurring contributor to sulfur levels. Sulfuric acid is used for pH adjustment to optimize fermentation and distillation conditions. The generation of chlorine dioxide from sodium chlorite is improved with the addition of sulfuric acid. The industry needs to be wary of adopting antimicrobials that can add more sulfur to DGs through the addition of sulfuric acid.

CLEANING ACIDS

Sulfamic acid, as a cleaning agent, is used to remove mineral scale in heat exchangers. The amounts and frequency of cleanings need to be minimized, within reason, to reduce the contribution of sulfur into the recycle streams while still maintaining a clean system.

SODIUM BISULFITE

Sodium bisulfite is utilized to remove acetaldehydes from the CO₂ scrubber. Its use can be minimized by making more frequent inspections of scrubber gas emissions to ensure that the sodium bisulfite dosage is optimized. Overuse

of sodium bisulfite will contribute to sulfur levels and can stress the yeast into producing more glycerol thus reducing ethanol yield.

Phibro's Ethanol Performance Group will work with customers by performing a nutritional profile analysis on their DGs co-products. Test results are compared to national averages and to other undisclosed ethanol plants. A strategy is then developed to aid the Phibro customer in dealing with areas that are problematic. For more information on sulfur in DGs, please contact your Phibro representative or call 800-223-0434.

NEWS

PHIBRO JOINS GROWTH ENERGY

With Phibro's 60 year history, we know the roll that trade organizations play in the health of an industry. It can be difficult work and often times the power of many voices is needed. To continue our history of support, Phibro's Ethanol Performance Group (EPG) has joined the national organization Growth Energy. On a regional basis, Phibro's EPG has also joined the Iowa Renewable Fuel Association. It is our belief that the proactive approach of each of these organizations will help strengthen and grow our industry.

PHIBRO AWARDS SCHOLARSHIP

Scott Gemmell, director of sales for Phibro's Ethanol Performance Group, recently presented a scholarship for \$750 at the Distillers Grain Technology Council's (DGTC) annual meeting in Des Moines, Iowa. The scholarship was awarded to Victor Perez-Mendoza, who was among many that submitted an abstract to DGTC showing new viewpoints on distillers grain and ethanol production. For a complete look at the winning abstract, please visit www.lactrol.com.

FUEL ETHANOL WORKSHOP & EXPO

See Phibro at the 2009 Fuel Ethanol Workshop & Expo (FEW) conference in Denver, June 15-18. Visit with Phibro's

Ethanol Performance Group (EPG) staff in booth number 144, located adjacent to the front entrance of the exhibit hall. We hope you'll drop by to see what is new with Phibro's EPG.

PROCESS OPTIMIZATION SESSION ADVANCED FERMENTATION CLASSES SCHEDULED JULY 29-30

Phibro's Ethanol Performance Group is teaming up with three other ethanol ingredient companies to host a joint training event in Minneapolis, Minn. As the ethanol industry strives to survive in this new economy, customer training has never been more important. This regional event will offer in-depth training to lab managers and plant managers alike on the technical aspects of the products being discussed. Participating companies in addition to PhibroChem are: Fremont Industries, Novozyme and Fermentis. The schedule will consist of four sessions in small classroom settings to allow for one-on-one interaction with the instructor and some hands-on training in the lab. Additionally, the group will attend a Minnesota Twins baseball game against the Chicago White Sox. For more information on the event, please contact your Phibro representative or Tom Slunecka at tom.slunecka@phibrochem.com or 612-554-8078.

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