Hydrolyzed Distiller’s Grain Production, Fermentation, and Animal Feeding Trials

1. Abstract

Ethanol production in the United States has increased to more than 2.3 billion gallons per year (bgy) and is expected to reach 5 billion gallons per year by the United States by 2015. The side streams of ethanol production of 1.2 billion tons per gallon of distillers grain (DG) is expected to drive down the price of DG as a feedstock supplement. To increase corn production and stabilize harvest prices, dry distillers grains are emerging as high protein quality as DG. One possible improvement is to increase the protein content of DG by converting the residual starch and fiber to protein.

Methods were developed to recover proteins, and data was analyzed by multivariate analysis to show the importance of starch and fiber and the importance of the feed ingredients. For example, the feed ingredients were analyzed prior to the start of the trial to determine the nitrogen content of the feed ingredients. The nitrogen content was then used to calculate the amount of nitrogen that would be available from the feed ingredients. The nitrogen content of the feed ingredients was then used to calculate the amount of nitrogen that would be available from the feed ingredients. The nitrogen content of the feed ingredients was then used to calculate the amount of nitrogen that would be available from the feed ingredients.

The high protein levels (~57%) available in HDG show promising economics for incorporating this process into corn ethanol plants. One possible improvement is to increase the protein content of DG by converting the residual starch and fiber to protein. This process has been developed and shown to be successful in producing high protein contents.

2. Introduction

In 2001, 56 ethanol plants were in production in the U.S. with nearly a dozen more expected on line by 2005. Of these, 56 ethanol plants were in production in the U.S. with nearly a dozen more expected on line by 2005. Each ethanol plant produces 2 to 10% of the total ethanol produced in the U.S. with each ethanol plant producing 2 to 10% of the total ethanol produced in the U.S.

3. Materials and Methods

- Distillate-irrigation of DG with broad diet mix
- BG 20% with ZipperClave and Steam Gun reactors
- Steam, SO2, and di, H2O (1,1–3,3)
- 140°C – 185°C
- 5 min–10 min residence time

4. Materials and Methods

Turkey Feeding Trial

- Phase 1: Characterization of DG was performed to identify protein, fiber, moisture, minerals, and trace elements, starch and dry.
- All feeds used in this study were fermented with steam, SO2, and H2SO4.
- Washing corn and enrich with 7.5% H2SO4, solubilized starch and fiber in HDG.
- The protein content of the feed ingredients was used to calculate the amount of nitrogen that would be available from the feed ingredients.

5. Results

- The high protein levels (~57%) available in HDG show promising economics for incorporating this process into corn ethanol plants. One possible improvement is to increase the protein content of DG by converting the residual starch and fiber to protein.

6. Conclusions

- Pretreatment of DG with steam, SO2, and di-H2O, results in high soluble sugar yield and conversions using steam, SO2, and di-H2O pretreatment of DG.
- Table 4 shows weight gains of turkey poults at 2 weeks fed with inclusion of 5%, 10%, 15%, and 20% HDG.
- Table 5 shows weight gains of turkey poults at 2 weeks fed with inclusion of 5%, 10%, 15%, and 20% HDG.
- Table 6 shows weight gains of turkey poults at 2 weeks fed with inclusion of 5%, 10%, 15%, and 20% HDG.