



Mississippi Corn Promotion Board 2012 Progress Report

Project Title: Performance of Cattle Fed Dried Distiller's Grains Produced from Mycotoxin Contaminated Corn

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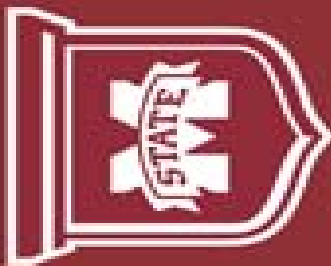
Project Summary (Issue/Response)

Aflatoxin contamination of dairy feed is a serious concern for dairy producers. Since up to 70% of the aflatoxin found in the diet (AFB1) could be transferred into the milk (AFM1) making that milk non-saleable, contamination of feed can pose a severe economic drain on dairy producers. Federal regulations limit the allowable concentration of AFM1 to 0.05ppb, which translates to a limit of 20 ppb in the dairy cow's ration. Given the widespread drought conditions across the U.S. this year, aflatoxin contamination in corn grains is expected to be highly prevalent and as such most buyers of milk have increased their testing requirement. Some research has been done to utilize adsorbents in the diet to 'bind' the aflatoxin. However, the results are very conflicting and change with dietary concentrations, rate of intake, and stage of milk production. Twelve multiparous Holstein cows were fed either a control TMR (CON), the control TMR with addition of AFB1 infected corn (AF), or the AF TMR with the addition of an anti-caking agent (AF+B). To try to answer these questions, cows were fed individually in a Calan Gate System (American Calan, Northwood, NH), twice daily for a total of 30 days. Feed (DM) intake and milk yield were collected daily. Body weights and measures and milk samples were collected weekly. Feed and orts samples were analyzed for dry matter, total Kjeldahl nitrogen, NDF, ADF, ash, fat, and AFB1 concentrations (Veratox, Neogen Corp, Lansing, MI). Milk samples were analyzed for fat, protein, SCC, and AFM1 (GC/MS).

Project Results/Outcomes

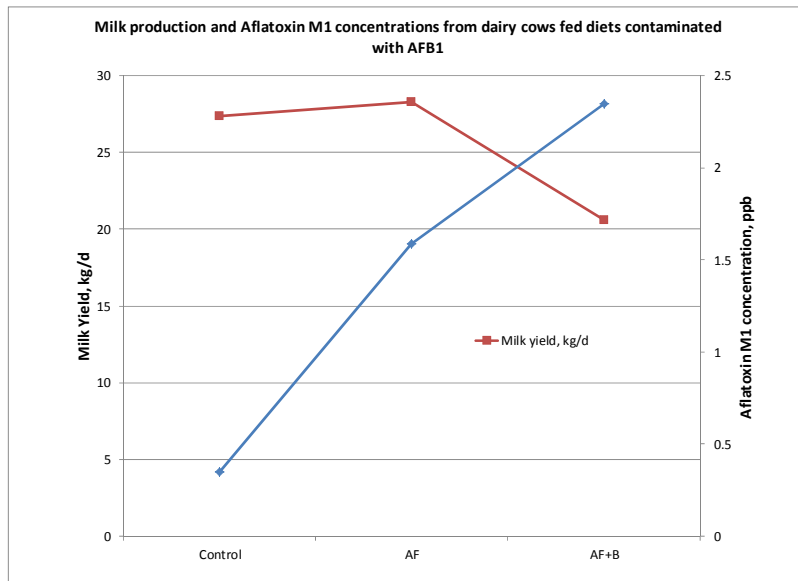
Cows consuming AFB1 had greater concentration of AFM1 in their milk, specifically, cows fed the adsorbent had the greatest concentration of AFM1 in their milk. Milk yield was also lower in cows fed AFB1, where cows fed the adsorbent also had the lowest milk yield. The results of this study are similar to other work done at North Carolina State University (Stroud, MS Thesis), where this particular type of adsorbent

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Project Results (cont.)

(clay binder) was not effective at reducing the transfer of AFB1 from the diet to AFM1 in the milk. Most people believed that these adsorbents 'bind' to the AFB1 at low pH (i.e. in the small intestine) and prevent it from being absorbed. However, this theory is not proven and recent work by A. Brown and D. Sparks (Department of Biochemistry and Molecular Biology, also funded by the MS Corn Promotion Board in 2011) actually shows that the binding efficiency of this adsorbent is highest at a pH of 6 and lowest around pH of 4, indicating that the AFB1 may be bound in the rumen and released in the small intestine. The results of this feeding trial supported that theory, since cows that were fed the adsorbent produced milk with almost twice the concentration of AFM1 compared to the control.



Project Impacts/Benefits

The results of this study provided information for producers on efficacy of adsorbent use in diets contaminated with AFB1. So far this year, at least three producers in MS have shipped milk that tested positive for AFM1 and results from feeding trials like this one have allowed extension and research personnel to work closely with producers and their consultants on the most effective dietary treatment for eliminating AFB1 from the diet and subsequently AFM1 from the milk.

In addition to the producer benefits, results from this study have prompted PIs (Ward, Rude) to collaborate with PIs in other departments (J. Ward, ABE; A. Brown and D. Sparks, BCH) to compile a USDA-AFRI grant focusing on critical and emerging issues in food safety. The ultimate goal of this grant is to (1) identify and model growing conditions for *Aspergillus* in grain storage bins, (2) determine the most effective combination of adsorbents in the diet of dairy cows to reduce the impact of AFB1, and (3) to determine the potential for using adsorbents to remove AFM1 directly from milk. The total funds requested on that RFP was \$300,000.

Project Deliverables

Extension bulletin on use of adsorbents in dairy cattle feed.

Journal of Dairy Science manuscript submission

Presentation of results at Dairy Producers Meeting in Fayette, Alabama

Preliminary data utilized to develop a federal grant (USDA-AFRI for Food Security)

A second study has been designed and will be conducted (with request of no-cost extension) to test different types of

adsorbents at varying concentrations in rumen fermentors.

