

Byo-DigestAid Effects on Growth Performance of Beef Calves Consuming Corn-Based Diets

The livestock industry for years have been using nutritional programs to improve animal performance and maximize profitability. For example to improve meat and milk production in cattle, it requires a careful balance of nutritional energy sources such as the balance between fiber and starches. While this approach works, the industry faces growing challenges. For example, using higher starch ingredients, such as corn, will increase energy availability and production efficiency; however, there is also an increase in digestive and metabolic problems for the animal, which can drag efficiency down. In addition the livestock feeding industry has witnessed a significant price increases in all feed ingredients. This means that there is pressure to develop ways to increase production efficiency using less expensive ingredients.



One approach to improving the efficiency is help animals digest their feed more efficiency or help them use cheaper but harder-to-digest feed. This can be accomplished through the use of enzymes. Enzymes are a special type of protein that help speed up chemical reactions within the body. For example enzymes can help speed up digestion and help release more nutrients from harder-to-digest products like soy hulls. Enzymes are common in many feeds, especially in poultry and swine. They are also being used as additives in ruminant diets.

This project was designed to determine if beef cattle that are fed normally high levels of corn instead are fed a diet of corn blended with less costly common feed by-products, (i.e. soybean hulls) with and without Byo-DigestAid are able to better digest the feed. This will be monitored by measuring the gain-to-feed ratio.

Byo-DigestAid is a fermentation product consisting of a blend of *Aspergillus Oryzae* 458, *Bacillus Subtilis* 681 and *Trichoderma Viride* 007. Byo-DigestAid increases the availability of certain enzymes, particularly cellulase and α -amylase, which are known to increase digestion of fiber and

Materials and Methods

Preparing Cattle

One-hundred crossbred steers (288 ± 31 kg body weight) were fed for up to 70 days following a 14-day receiving period. To reduce variability all cattle were vaccinated to control internal and external parasites with an injectable ivermectin. A vaccination and booster for IBR, BVD 1 & 2, PI3, BRSV & Mannheimia haemolytica as well as for clostridial infections was also given. Finally, all steers were implanted with Revalor XS.

To help control, measure, and record feeding, each cattle had electronic GrowSafe ID tags attached. Treatments were mixed and fed in a random order each day with all of the treatments containing no enzyme preceding the enzyme-containing treatments. Final weights were measured on the final day of

the study and fecal grab samples were collected. All weights were measured prior to the daily feeding. Data from each group was averaged and standard error of measurements are reported. Statistical analysis including repeated ANOVA analysis with significance being $p < 0.05$.

Formulating the Diet

The diets were formulated to meet rumen degradable protein (RDP) and rumen degradable nitrogen (RDN) requirements. Predicted gains were normalized across treatment (TRT) by meeting amino acid (AA) requirements of the lowest metabolizable energy (ME) diet and adjusting AA of greater ME diets to meet but not exceed the average daily gain (ADG) of the lowest ME diet. RDP, RDN, and AA requirements were met with use of urea, soybean meal, Amino Plus, and porcine blood meal. Mineral inclusion rates were formulated to meet United States National Research Council (NRC) recommended levels for growing cattle. Rumensin® 90 was included in the diet to provide 27 grams of monensin per ton of feed as-fed. The diets containing Byo-DigestAid were dosed with the product at 0.045%. Choice white grease was included in the pelleted supplement at a rate of 40 pounds/ton of pellet to improve pellet quality. With the exception of the whole-shell corn (WSC) and soybean hulls (SH), all ingredients including Byo-DigestAid were pelleted. The WSC, SH, and pelleted supplement were combined on farm in the truck-mounted mixer.

Feeding Ratio

Five different diets with increasing amounts of soybean hulls were prepared. 0, 7, 14 and 28% of the whole-shelled corn feed was replaced with soybean hulls (SH). For example, the 100% WSC diet contained no soybean hulls but only whole-shelled corn. The 72WSC 28SH contained 72% whole-shelled corn and 28% soybean hulls. In addition, each treatment was fed with and without Byo-DigestAid.

Results and Discussion

Figures 1 and 2 show the average daily gain (ADG) and Dry Matter Intake (DMI) of the different treatment groups. When the ADG is divided by the DMI, the grain-to-feed ratio can be calculated which shows how the diet and how Byo-DigestAid impacts their performance.

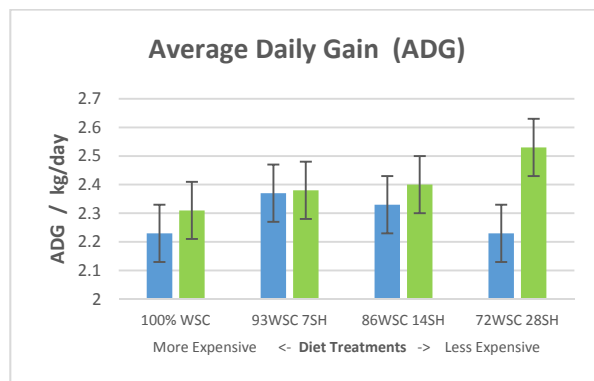


Figure 1. The average daily gain of cattle with (green; right bar) and without (blue; left bar) Byo-DigestAid as the amount of whole shelled corn (WSC) is replaced with less costly soybean hulls (SH). The graph suggests the trend that ADG increases with the addition of Byo-DigestAid. Error bars represent standard error.

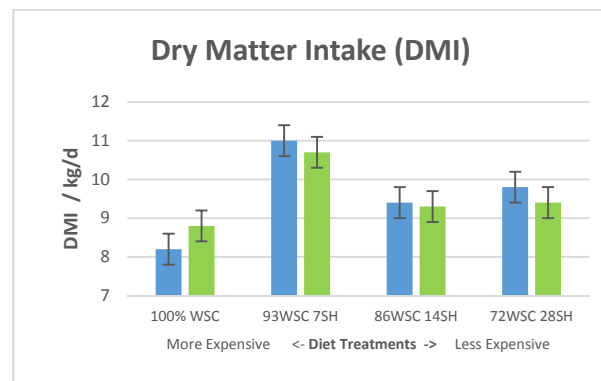


Figure 2. The average dry matter intake (DMI) of cattle with (green; right bar) and without (blue; left bar) Byo-DigestAid as the amount of whole shelled corn (WSC) is replaced with less costly soybean hulls (SH). The graph suggests that Byo-DigestAid does not increase or suppress DMI. Error bars represent standard error.

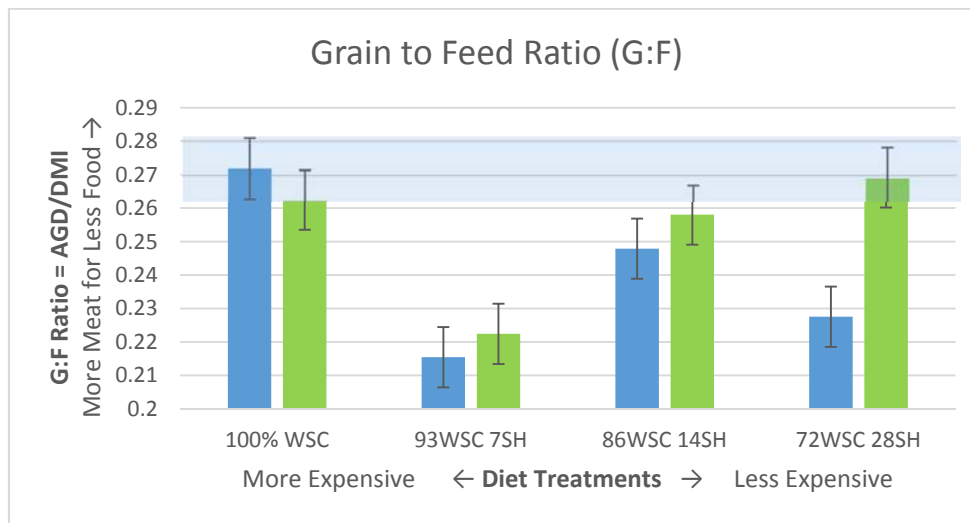


Figure 3. The Grain-to-Feed (G:F) ratio cattle with (green; right bar) and without (blue; left bar) Byo-DigestAid as the amount of whole shelled corn (WSC) is replaced with less costly soybean hulls (SH). The graph shows that Byo-DigestAid provides equivalent performance to 100% WSC when added to a 72WSC 28SH feed mix. Error bars represent standard error. The shaded region shows diets which are statistically equivalent in efficiency to 100% WSC.

Figure 3 shows that the addition of Byo-DigestAid to diets with increasing levels of soybean hulls resulted in an improvement in the gain per feed (G:F) ratio. Byo-DigestAid addition had statistically significant improvements in the G:F ratio 7% and 14.8%, for the 86WSC:14SH diet and the 72WSC:28SH diet respectively. This improvement is predominately caused by the increased ADG with the 72WSC:28SH diet increasing 13.5%. While 72WSC 28SH diet contained the most soybean hulls in this study, it does not represent the maximum potential of Byo-DigestAid as higher soybean hull containing diets were not attempted. Byo-DigestAid did not provide additional benefit for the 100% WSC diet.

These results suggest that diets with higher soybean hulls, which are also lower in energy, can provide equal or better feed efficiency when compared to diets where lower to no SH are fed. It also suggests that using Byo-DigestAid in combination with diets higher in fiber can result in feed efficiencies equal to diets lower in fiber and higher in both starch and net energy values.

Conclusions

Feed cost makes up the single largest single expense of the finished animal. Based on these data an apparent positive effect on feed efficiency can be observed through the feeding of Byo-DigestAid to finishing cattle. The results would suggest that ration costs could be lowered. Soy hulls are commonly as much as 20% lower in cost compared to WSC depending on market conditions. With a 28% replacement of WSC with SH this could result in reduced ration cost as much as 16%. Concurrently with improvements in feed efficiency by as much as the 14.8% in the high SH diet, this would also result in cost of gain reductions of similar magnitude thus resulting in improved profitability for the producer. From these data, including the cost of Byo-DigestAid, in the diet a projected return on investment (ROI) for this project would be 9.4 to 1. Additionally, modifying the ration formulation as a result of altered digestibilities and increased energy availability to the animal thus possibly lowering feeding costs even more appears promising. This supports other research indicating Byo-DigestAid can be a valuable part of a well-designed feeding program.

For more information, please contact your NuAgro Resources representative.