

Comparison of GMO and Conventional Corn Stover: Chemical Composition, Digestibility, and Intake Preferences by Beef Cows – Year 1 Progress Report

A.S. Leaflet R3140

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Summary and Implications

Data from this analysis suggest that differences in chemical composition likely exist when comparing conventional and GMO corn stover. However, the myriad of brands, hybrids, and trait combinations that exist highlight that more controlled plot-based studies need to be conducted, focusing on trait variation within a single corn isolate as to determine individual trait effects on these potential differences in feeding value.

Introduction

In the fall of 2013, the Iowa Beef Center conducted a series of 7 listening sessions across Iowa in which stakeholders identified land access and grazing opportunities as a challenge to herd expansion. Specifically, they identified the need for more/alternative grazing opportunities as well as more information on some aspects of current grazing systems and programs. These included increased utilization of CRP lands, reverting marginal lands from row crops back to pasture, increased utilization of cover crops for forage, and the need for research on palatability of modern varieties of corn residue.

The concern of palatability and digestibility of GMO corn residue continues to be a topic of interest among many cow-calf producers. To this point, little research has been published on the effects of GMO corn residue on intake and performance of beef cows, particularly in comparison to non-GMO (conventional) corn residue. The objective of this project was to compare intake, ADF and lignin composition, and digestibility of GMO and non-GMO corn residue.

Materials and Methods

Corn leaf, husk, and shank material was collected post-harvest and prior to a rain event by multiple producers and extension specialists around the state of Iowa. These components were selected as they represent the portion of the corn stover that cows are most likely to consume when free-grazing corn residue. Thirteen conventional samples and 24 GMO samples representing various brands, hybrids,

and trait levels were sent to a commercial laboratory for wet chemistry analysis of fiber, lignin, and digestibility.

For the feeding portion of the trial, small square bales of both a single GMO and a single non-GMO variety were made at ISU during a similar timeframe of harvest in which no rain events occurred. Bales were stored inside and subsequently disassembled and sorted into either stalk and cob material, or leaf, husk, sheath, and shank. The latter portion was used for the feeding trial.

Intake preferences between stover type was determined at the Zumwalt Station using a switchback experimental design. Six open, non-pregnant beef cows were individually penned, and were restricted from feed access for 16 hours prior to being given their stover allotment. During each feeding period 3 cows were offered GMO and 3 offered conventional residue (leaf, husk and sheath material) with a minimum of 2.0% of BW allotted at the time of feeding. Residue was then weighed back 6 hours later to determine intake. This feeding process was conducted a total of 3 times, with cows being offered alternating stover (GMO vs. conventional) at each feeding. A 6 day clean out period where all cows had access to a corn silage based-TMR was observed between each stover feeding day.

Results and Discussion

Conventional stover samples that were submitted for chemical composition contained a greater proportion of ADF and NDF when compared to GMO varieties (Table 1). However, the digestibility of that NDF fraction was greater in the conventional varieties when compared to GMO. This was likely in part due to a lesser lignin concentration in conventional than GMO varieties.

During the feeding trial, cows tended to consume a greater amount of GMO corn stover compared to conventional. This difference in intake was maintained even when adjusted to a percent of body weight basis.

It should be noted that this pilot project analyzed a wide variety of brands and hybrids for chemical composition. The feeding trial contained 2 different brands and hybrids of stover as well. These data do suggest that differences may exist between conventional and GMO corn stover in terms of chemical composition as well as intake. However, the myriad of brands, hybrids, and trait combinations that exist highlight that more controlled plot-based studies need to be conducted, focusing on trait variation within a single corn isolate as to determine individual trait effects on these potential differences in feeding value.

Acknowledgements

This project was funded in part by the Iowa Beef Center mini-grant program #1502.

Table 1. Chemical composition and digestibility of conventional and GMO corn stover leaf, husk and shank samples.

Item	Stover type ¹		SEM ²	P-Value
	Conventional	GMO		
% of Dry matter				
Neutral detergent fiber	80.06	76.23	1.09	< 0.01
aNDFom ³	77.12	73.64	1.15	0.02
Acid detergent fiber	47.96	46.25	0.78	0.09
Lignin	4.12	4.71	0.27	0.08
Lignin as % of NDF	5.58	6.41	0.36	0.07
NDFD48	69.35	66.51	1.18	0.06
uNDFom48	23.64	24.63	0.94	0.41

¹ Conventional (non-GMO from various brands and hybrids) and GMO (various brands and hybrids composed of various traits and combination of traits).

² Larger SEM presented. Conventional n = 13; GMO n = 24.

³ Ash-free neutral detergent fiber.

Table 2. Dry matter intake of conventional and GMO corn stover leaf, husk and shank samples.¹

Item	Stover type ²		SEM ³	P-Value
	Conventional	GMO		
6 hour dry matter intake ⁴				
Lbs	10.53	13.47	1.32	0.06
% of body weight	0.74	0.95	0.08	0.06

¹ Cows had feed access restricted for 16 hours prior to access to corn stover. Cows were allowed 6 hours to consume stover.

² Conventional (non-GMO from various brands and hybrids) and GMO (various brands and hybrids composed of various traits and combination of traits).

³ n = 9