

Demonstrating Calcium Oxide Treatment of Forages

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Summary and Implications

Corn stalks treated with calcium oxide CaO showed no change in in vitro dry matter digestibility (IVDMD) at 3 or 7 days after treatment, but a small increase of 2 units in IVDMD at 14 days after treatment. Corn stalks and corn silage mixed had no change 3 days after treatment but a 7 unit IVDMD increase by day 7 and a 1 unit increase at day 14. Corn silage alone had no change at day 3 or 7 but at day 14 there was a small 2 unit increase in IVDMD. Cornstalks ground to a smaller particle size and treated with calcium oxide stalks increased 5 units on average in IVDMD. There was considerable variation in the treated samples IVDMD.

Introduction

Previous and ongoing research on calcium oxide treatment of forages led to demonstration work at the Iowa Lakes Community College farm feedlot in Emmetsburg Iowa. The farm had corn stalks and corn silage available. The demonstration work included batch treating corn stalks, corn stalks and corn silage mixed and corn silage alone and quantifying the effect of treatment on digestibility of the forage. In addition to demonstrating the treatment process to students, interested producers were also made aware of the demonstration. Demonstration work was conducted by ISU Extension Specialist and Community College staff and students and Archer Daniels Midland (ADM) staff. The work was supported financially by an Iowa Beef Center mini grant and ADM.

Materials and Methods

Two demonstrations were conducted. In the first demonstration ground corn stalks and ensiled corn silage were treated. Since corn silage was available it was used with the thought it could potentially be the water source to achieve 50% moisture for treatment and the CaO may increase the digestibility of the forage in the silage. The corn stalks were ground with no screen in the tub grinder. The cornstalks and corn silage were initially analyzed at Dairyland Labs so that dry matter was known for mixing purposes. Four small batches consisting of 2 corn stalks batches, 1 batch of 1/3 corn stalk and 2/3 corn silage, and 1 corn silage only batch were treated. Samples of the untreated material were taken previous to mixing. Ground

cornstalks were added to a feed mixer wagon, water was added to achieve 50 % moisture and then the CaO (Microcal OF 200 produced by Mississippi Lime) was added at 5% of the dry weight of the cornstalks. After mixing the batches were unloaded in a small bunker created by large round bales. One batch of cornstalks was packed and the other was not. One batch of two third corn silage and one third corn stalks was mixed so that the final mixture would be at 50% DM. The mix was treated with CaO at 5 % of DM mixed, unloaded and packed into a mini bunker. A silage only batch was treated with CaO at 5% of DM as well and then packed and stored in a min bunker.

Samples were taken 3, 7 and 14 days after treatment from the stored piles. The samples were dried in a forced air oven drier overnight after sampling and then sent to Dairy One laboratory for 48 hour in vitro digestibility analysis.

A second demonstration was conducted with cornstalks only that were ground using a 3 in screen. 13 mixer wagon loads of approximately 1000 pounds each after treatment were treated, mixed, stored in a packed pile and fed. 5 samples of the untreated and 1 sample from each treated batch were taken after mixing for analysis 1 week after sampling. Sampling of the untreated cornstalks was done by taking several grab samples of the untreated material at several locations in the pile then mixing and taking a subsample of that mix. Sampling of the treated material was done by passing a bucket under the unloading auger of the mixer wagon while unloading the treated mix several times then mixing that sample and taking a subsample. The pH of each treated sample was taken immediately after mixing and each treated load had a pH of above 13 indicating that each load had been effectively treated. This treated material was fed to finishing heifers at 20% of dry matter. Previous ration being fed was a lower % of untreated cornstalk ration. No change in intake or performance was observed after switching to the treated cornstalk ration.



Adding water to the cornstalks.



Adding the calcium oxide to the wet cornstalks.

treated samples was larger than the untreated samples. These results would indicate that even with good sampling procedure and analysis it is hard to estimate the value of these feedstuffs through sampling and testing. It would also indicate that treatment methods may influence the consistency of the treated product which would require further research to document.

Results and Discussion

The data from the lab analysis in the first demonstration is shown in the table 1. Increase in digestibility did not occur until 7 days after treatment in most cases. A small increase was noted with the cornstalk only or cornstalk and corn silage mixed treatments. It was speculated that a coarser grind and or a relatively high initial IVDMD resulted in lower than expected increase in digestibility. The averages and standard deviation of the lab analysis of the 5 untreated samples and 13 treated batches from the second demonstration is in Table 2 .In this demonstration there were larger increases in digestibility in some batches but not in others. Standard deviation of the IVDMD in



Treated cornstalks.

Table 1. Digestibility change in treated forages.

Feedstuff and treatment	Sample Day	NDF	IVDMD 48	NDFD 48	Unit Change from Day 0	
					IVDMD 48 hrs.	NDFD 48 hrs.
Corn stalks not treated	D0	78.1	71	63		
Corn stalks corn silage not treated	D0	66.2	72	58		
Corn silage not treated	D0	53.0	81	63		
Corn stalks not packed treated	D3	76.9	71	62	0	-1
Corn stalks not packed treated	D7	77.4	70	61	-1	-2
Corn stalks not packed treated	D14	75.8	73	65	2	2
Cornstalks packed treated	D3	75.8	65	54	-6	-8
Cornstalks packed treated	D7	74.0	71	61	0	-1
Cornstalks packed treated	D14	71.8	73	62	2	0
Cornstalks corn silage treated	D3	68.0	72	58	0	0
Cornstalks corn silage treated	D7	62.0	79	66	7	8
Cornstalks corn silage treated	D14	70.2	73	61	1	3
Corn silage treated	D3	43.7	79	52	-2	-11
Corn silage treated	D7	49.6	79	58	-2	-5
Corn silage treated	D14	39.2	83	57	2	-6

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Table 2. Average and standard deviation of untreated and CaO treated cornstalks.

ID	% M	% P	% ADF	% NDF	% ASH	% Ca	IVDMD	NDFD
5 untreated samples								
AVG.	20.04	5.84	48.26	74.54	6.83	0.41	58.40	44.00
STDEV	0.55	0.66	0.79	2.68	0.62	0.05	1.98	4.22
13 treated samples								
AVG.	54.52	4.76	45.34	68.28	13.43	4.00	63.40	46.60
STDEV	4.92	0.23	0.81	3.24	2.14	0.86	5.04	5.57



Participation Iowa Lakes Community College Students.

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