



# In Situ Dry Matter Disappearance Evaluations of Readco®/Calcium oxide Treated Corn Replacement Pellets when Compared to Native Forms

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## Introduction

Last year the ethanol industry fermented 1.6 billion bushels of corn to produce over 15.1 billion liters of ethanol. Future forecasts predict that 56.8 billion liters of ethanol will be produced by the last quarter of 2010. This will require almost 5.5 billion bushels of corn to be fermented to meet the quota. Since the livestock industry uses 6.1 billion bushels of corn per year, with ruminants using 1.4 billion bushels per year, it is logical that the corn fed to ruminants will be reduced and an alternative feed be replaced, since they are the least efficient at converting feed into gain when compared to swine and poultry. Thus, the goal of this research is to find an alternative replacement for corn in ruminant diets using available lower quality feedstuffs and unlocking their potential digestibility via mechanical and chemical actions creating a corn replacement pellet (CRP).

## Objectives

Four studies were conducted to evaluate in situ dry matter degradation of lower quality feedstuffs when processed through a twin screw 12.7 cm Readco® processor (Figure 1) with the addition of calcium oxide. Comparisons were made of the processed feedstuffs to the native form to detect a difference in overall dry matter disappearance.

## Materials and Methods

All feedstuffs were ground to 3.81 cm and processed as-is through the Readco® processor with the addition of 35% water, 25% DDGS, and 5% calcium oxide on DMB. Product exited the die plate at 27% moisture and were dried to 13% using a Belt-O-Matic® dryer. Approximately 5 grams of each substance were placed into 5x10 cm concentrate bags and placed into the rumen of a fistulated steer fed a silage, hay, dry cracked corn diet for a 48 hour incubation period. All substances were run in quadruplets to minimize statistical error. ADF, NDF CP and Pre/Post-DM are presented in Table 1. Processing effect is listed in Graph 1. Dry matter disappearance is presented in Graph 2.

**Treatment 1:** Corn stover Readco® processed vs. Unprocessed corn stover.

**Treatment 2:** Wheat straw Readco® processed vs. Unprocessed wheat straw.

**Treatment 3:** Wheat Chaff Readco® processed vs. Unprocessed wheat chaff.

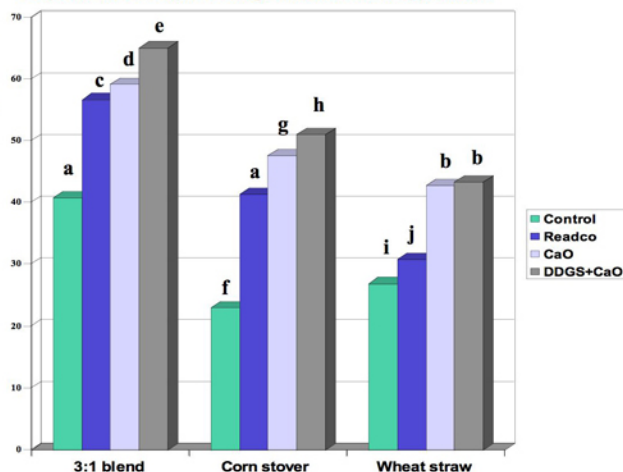
**Treatment 4:** Corn fiber/Wheat chaff blend 3:1 Readco® processed vs. Unprocessed corn fiber/wheat chaff blend.

Table 1. Nutrient values for unprocessed and processed feedstuffs with DDGS.

Feedstuff	Pre/Post-Readco Processed DM %	ADF% (DMB)	aNDF% (DMB)	CP% (DMB)
Corn Stover	8.3	54.6 <sup>a</sup>	81.3 <sup>a</sup>	4.4 <sup>a</sup>
Readco corn stover	13.1	37.8 <sup>b</sup>	55.5 <sup>b</sup>	11.8 <sup>b</sup>
Wheat Straw	10.0	51.4 <sup>a</sup>	43.5 <sup>a</sup>	4.2 <sup>a</sup>
Readco wheat straw	5.4	36.6 <sup>b</sup>	27.0 <sup>d</sup>	12.4 <sup>b,d</sup>
Wheat chaff	10.9	51.4 <sup>d</sup>	27.7 <sup>d</sup>	6.7 <sup>a</sup>
Readco wheat chaff	6.1	30.0 <sup>c</sup>	18.3 <sup>f</sup>	14.3 <sup>c,d</sup>
Corn fiber/wheat chaff 3:1	47.1	24.6 <sup>c</sup>	60.4 <sup>c</sup>	10.1 <sup>b,c</sup>
Readco corn fiber/wheat chaff 3:1	13.0	22.1 <sup>c</sup>	57.2 <sup>b,c</sup>	14.4 <sup>f</sup>

a,b,c,d,e,f Means differ by column (P < 0.01)

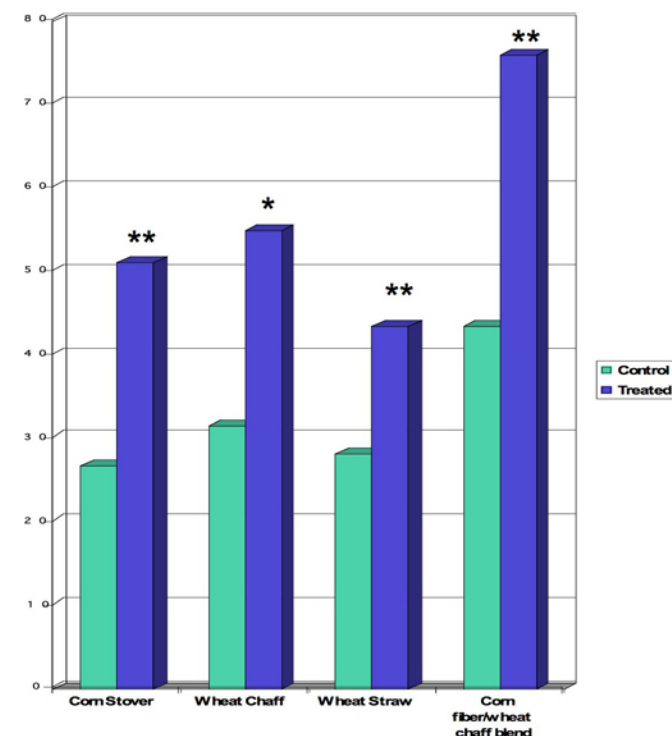
Graph 1. Effects of processing on in situ DM disappearance



a,b,c,d,e,f,g,h,i,j Significant difference of P < 0.05 SEM 0.8212



Graph 1. Comparative values of DM disappearance of feedstuffs.



\*Means within the graph by treatment differ by P < 0.004 (SEM 1.12).

\*\*Means within the graph by treatment differ by P < 0.0001 (SEM 0.7437).

## Conclusions

- Processing lower quality feedstuffs through the Readco® continuous processor improved the in situ DM disappearance (P < 0.004 or P < 0.001) when compared to the native form.
- Overall NDF and ADF of Readco® processed feedstuffs showed a significant improvement over the native form (P < 0.05).
- The effect of the Readco® processor increased in situ DM disappearance by 4.0%, 18.4%, and 15.9% respectively over the control for wheat straw, corn stover, and the 3:1 blend (P < 0.05).
- Calcium oxide significantly increased in situ DM disappearance by 6.3%, 2.5%, and 12.7% when compared to the Readco® processed corn stover, 3:1 blend, and wheat straw treatments (P < 0.05).
- The addition of DDGS increased in situ DM disappearance by 5.9% and 3.4% for the 3:1 blend and corn stover treatments (P < 0.05).
- Future research includes lamb metabolism trials where CRP's are utilized and compared to a conventional corn based diet and the CRP's native form prior to processing.

Figure 1. Readco® Processor

