



Digestibility of Corn Replacement Pellets in Growing Lamb Diets

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Introduction

Previous in situ research has indicated that Readco® processed feedstuffs with the addition of 35% water, 25% DDGS, and 5% calcium oxide successfully increased DM disappearance over their respective controls. Therefore, a lamb metabolism trial was designed to test the Readco® processed feedstuffs to determine nutrient digestibility when compared to positive and negative control diets.

Objectives

Three studies were conducted to evaluate nutrient digestibility of lower quality feedstuffs when fed to growing lambs. Corn replacement pellets (CRP) were fed at two levels (30 and 60%) to determine the optimal corn replacement level. All feedstuffs were processed through a twin screw 12.7 cm Readco® processor (Figure 1) with the addition of calcium oxide, with the exception of the positive and negative control diets. Comparisons were made of the processed feedstuffs to the native form and a positive control diet to detect a difference in overall digestibility of DM, ADF, and NDF.

Materials and Methods

All feedstuffs were ground to 3.81 cm and processed 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. Lambs were fed in three separate trials, each utilizing a different substrate. Each trial consisted of two periods utilizing two groups of 15 lambs with three lambs per treatment. Lambs were fed at 1.8% of BW with the exception of the trial 3, where they were fed at 2.5% of BW. On test average weights were as follows: Trial 1 33.1 kg, Trial 2 33.3 kg, and Trial 3 42.8 kg. CRP's and their respective negative controls fed in these trials were fed at intermediate and high inclusion levels: 1) Wheat straw CRP and negative control, 2) Corn Stover and negative control, and 3) Corn fiber/Wheat chaff (3:1) blend and Switchgrass CRP. All CRP diets were designed to replace an equal fraction of corn or the ground negative control substrate, while keeping DDGS constant. Digestibilities (ADF, NDF, and DM) were analyzed in PROC MIXED in SAS with LSMEANS separation. All data were pooled by trial and tested for an treatment x period interactions, which were removed from the models due to non-significance (P=0.67). Dietary treatments are as follows for the three trials with the substitution of the negative control and CRP diets with other feedstuffs (on DMB):

Treatment 1: Corn (59%) with DDGS 25%, corn silage 13 %, limestone 2.5%, and urea 0.5%

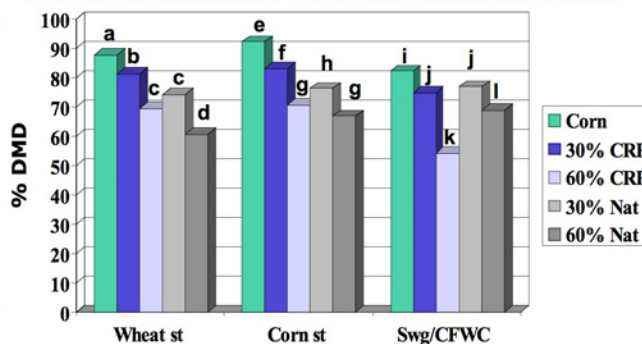
Treatment 2: 29 % CRP with 31% corn, 26% DDGS, 14% corn silage, and urea 0.5%

Treatment 3: 59% CRP with 0% corn, 27% DDGS, 14% corn silage, and urea 0.5%

Treatment 4: 22% native with 27% corn, 34% DDGS, 14% corn silage, limestone, and 0.5% urea

Treatment 5: 43% native with 0% corn, 41% DDGS, 13% corn silage, 2.6% limestone, and 0.5% urea

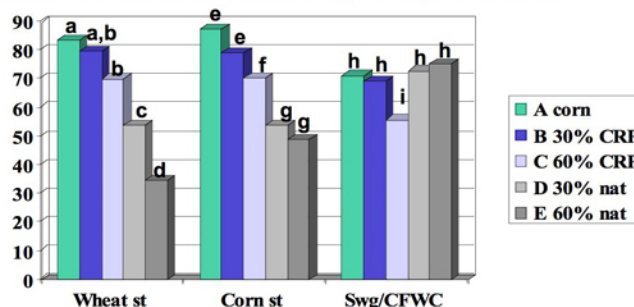
Graph 1. Digestibility of CRP's vs. Positive and Negative Controls



a,b,c,d P<0.05 SEM 0.02, e,f,g,h P<0.05 SEM 0.03, i,j,k,l P<0.05 SEM 0.03

CFWC/Swg 30% CRP= 30% Swg, 60% CRP=60% Swg, 30% Nat=30% CFWC CRP, 60% Nat=60% CFWC CRP

Graph 2. Comparative values of NDF digestibility of feedstuffs.



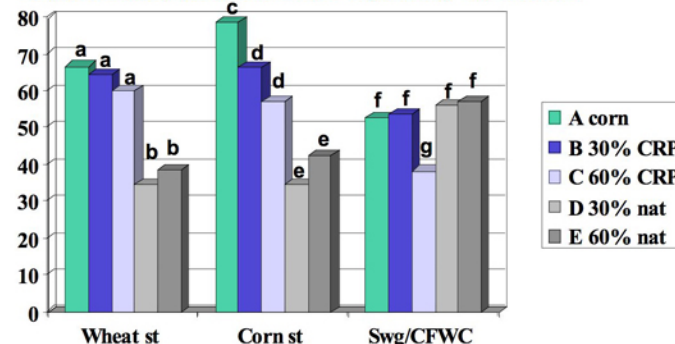
a,b,c,d P<0.05 SEM 0.05, e,f,g P<0.05 SEM 0.08, h,i P<0.05 SEM 0.04

CFWC/Swg 30% CRP= 30% Swg, 60% CRP=60% Swg, 30% Nat=30% CFWC CRP, 60% Nat=60% CFWC CRP

Figure 1. Readco® Continuous Processor



Graph 3. Comparative values of ADF digestibility of feedstuffs.



a,b P<0.05 SEM=0.12, c,d,e P<0.05 SEM= 0.05, f,g P<0.05 SEM=0.05

CFWC/Swg 30% CRP= 30% Swg, 60% CRP=60% Swg, 30% Nat=30% CFWC CRP, 60% Nat=60% CFWC CRP

Implications

- Improvements for ADF and NDFd were noticed for processed corn stover and wheat straw CRP's when compared to native forms.
- Overall high fiber digestion is due to restricted intakes.
 - Increase digestibility relative to retention time.
 - Higher digestibility for more restricted intake, increased intake=increase rate of passage.
 - Possible decrease in rumen pH decreased fiber digestion when fed at higher intake level (2.5% BW).
- CFWC/Swg CRP's performed equally to the corn based diet when ADF and NDFd were observed at all inclusion levels with the exception of the 60% Swg CRP which was lower

Conclusions

- 30% inclusion rate of CRP pellets significantly increased DM digestibility when compared to both levels of the negative control as well as the 60% CRP inclusion rate.
- The digestibilities of the 30% CRP pellets were our optimal inclusion yielding 92.7, 90.3, 91.1, and 93.6 % DM digestibility when compared to the corn diet for wheat straw, corn stover, switchgrass, and corn fiber/wheat chaff CRP's.
- Readco® processed feedstuffs in most cases improved NDF and ADF digestibility when compared to their respective native forms.
- Future research includes a dairy beef growth performance trial utilizing the wheat straw and corn fiber/wheat chaff CRP pellets.