

PHYSICAL MODIFICATION AND(OR) SUPPLEMENTATION STRATEGIES TO IMPROVE THE FEEDING VALUE OF TALL FESCUE STRAW FOR BEEF CATTLE.

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SUMMARY: A digestion study was conducted to determine the effects of physical form (pelleting) and supplementation on the intake and digestion of tall fescue straw fed to beef cattle. Pelleting increased intake of tall fescue straw over long stem straw. Supplemented pelleted straw and pelleted straw/alfalfa mixture increased intake by 50 percent over long stem treatments. Additionally, intake of pelleted straw/alfalfa mixture was increased an additional 7 percent above supplemented pelleted straw. Apparently DMD (dry matter digestibility) was decreased with pelleting, however, digested DM (dry matter) of supplemented pelleted straw and pelleted mixture was increased 50 percent over long stem diets.

In Oregon, ongoing environmental concerns are forcing livestock producers from the east side of the state, as well as grass seed producers from the west side, to find alternative methods to traditional management and production systems. Grass seed producers traditionally burn grass seed fields after harvest as a means of sanitizing fields and removing straw residue. Yet, concerns over air pollution are forcing grass seed producers to utilize alternative methods for removing straw residues. Additionally, controversy over the use of public rangelands may force the beef cattle industry to rely on more winter hay feeding and private rangelands.

Although the concept of utilizing grass straw as a forage base for wintering beef cattle is not a new one, the concept is not widely practiced in Oregon. Grass straws tend to be high in fiber, low in protein, and therefore

coincide with low intakes. Thus, when used independently, grass straws are not adequately digested and will not provide the proper amounts of nutrients needed to maintain an acceptable level of beef cattle performance. However, when grass straws are used in conjunction with the proper amounts of supplement, grass straws can and are used very efficiently. Likewise, physical alteration of a low quality forage, such as chopping or pelleting, has also increased intakes. Thus the objective of the following study was to evaluate the effects of pelleting and/or supplementation of grass straw on intake and digestibility.

MATERIAL & METHODS

Twenty Hereford x Angus steers fitted with rumen cannula's were randomly assigned to one of the following treatments (5 steers/treatment): 1) long stem tall fescue straw; 2) long stem tall fescue straw plus supplement; 3) pelleted tall fescue straw; 4) pelleted tall fescue straw plus supplement; 5) pelleted tall fescue straw/alfalfa mixture (75% straw/25% alfalfa mixture). Steers receiving supplements were supplemented at a level of 25 percent of their previous 5 day intake with alfalfa pellets. Following a 14 day adaptation period was a 6 day intake period in which daily feed and ort (or refusals) subsamples were taken. During the intake period, feed and orts are weighed daily. Following the 6 day intake period, steers were fitted with total fecal collection bags. Total fecal collection is necessary for determination of digestibility (measured feed intake divided by measured fecal output gives an estimation of digestibility). All subsamples of feed (basal forage and supplement), orts and feces were analyzed for dry matter.

RESULTS & DISCUSSION

Nutritional quality of the diet (Table 1) indicates that pelleting of long stem tall fescue straw depressed neutral detergent and acid detergent fiber fractions of the diet. Neutral detergent fiber is a measure of the portion of plant material (in this case straw) that is mostly digestible (or a measure of the digestible portion of the plant cell wall). Neutral detergent fiber is also the primary determinant of intake. However, in general, acid detergent fiber is a measure of the portion of plant cell wall that is not digestible. Acid detergent fiber is inversely related to digestibility (higher ADF values relate to lower digestibility). In general, forage crude protein values of 6 to 8 percent have been an indication of when to supplement protein. The protein values of the long stem and pelleted straw (Table 1) fall within the range in which protein supplementation would be beneficial.

Pelleting tall fescue straw increased forage intake significantly ($P < .01$) over long stem straw by approximately 30 percent (Table 2.). Steers receiving pelleted straw consumed more than the steers on the long stem treatments. However, steers receiving supplemented diets consumed less forage ($P < .10$) than nonsupplemented steers. This may suggest that steers were only marginally protein deficient. Total DM intake (TDMI; forage intake plus supplement) also was increased by pelleting. Steers consuming pelleted straw consumed more ($P < .01$) than steers consuming long stem straw. Likewise, TDMI of steers consuming pelleted straw plus supplement and pelleted straw/alfalfa mix (MIX) were increased 50 percent over TDMI of steers consuming long stem treatments. Additionally, steers receiving MIX consumed an additional 7 percent over steers receiving pelleted straw plus supplement. A consumption of 2 percent of body weight for a low quality forage is often a target intake. In general, steers consumed approximately 2 percent of BW for both long stem and pelleted diets. However, steers receiving pelleted straw plus supplement and MIX consumed more than 3 percent of BW.

Apparent dry matter digestibility (ADMD; or the % of diet digested) was

decreased with pelleting. An increase in intake of a low quality is often accompanied by depression in digestibility. However, digested DM (or the actual lbs of forage digested) for pelleted straw was increased ($P < .05$) 50 percent over long stem diets. Thus, any depression exhibited in ADMD was greatly offset by the magnitude of increases in intake.

CONCLUSIONS

From the results of this study, pelleting of tall fescue straw had a significant impact on both intake and digestion. Furthermore, these data may suggest that pelleting tall fescue straw produces greater nutritional benefits than does supplementation; and pelleting, plus supplementation, produced more than additive benefits. Intakes of supplemented pelleted straw and MIX were increased 50 percent over long stem diets, and intakes of MIX were increased an additional 7 percent over supplemented pelleted straw. Therefore, these results may suggest that tall fescue straw may not be limited to mature nonlactating cows. But, may have potential of being a main component in diets of growing steers and heifers, as well as other species of livestock.

(See Tables 1 and 2 on following page).

Table 1. Nutritional Quality of Basal Diet and Alfalfa Supplement.

Item*	Long Stem Tall Fescue Straw	Pelleted Tall Fescue Straw	Pelleted Straw & Alfalfa Mixture	Alfalfa Pellets
CP, %	6.13	7.00	10.39	21.14
ADIN %	10.18	13.57	10.18	10.59
NDF, %	74.16	71.09	66.99	58.25
ADF, %	49.80	44.89	43.38	39.37

*Nutritional quality expressed on a dry matter basis for the following measures: CP = crude protein, ADIN = acid detergent insoluble nitrogen, NDF = neutral detergent fiber, ADF = acid detergent fiber.

Table 2. The Influence of Physical Form and (or) Supplementation on Dry Matter Intake and digestibility Estimates of Tall Fescue Straw for Beef Cattle.

Item*	TREATMENTS				
	Long Stem Straw		Pelleted Straw		Pelleted Mix
	No Suppl	Suppl	No Suppl	Suppl	
Dry Matter Intake, lb					
Forage ^{b,c}	17.40	12.69	21.01	19.84	20.90
Total ^{b,d}	17.40	16.52	21.01	26.44	28.23
Dry Matter Intake, % BW					
Forage ^{b,c}	2.05	1.51	2.39	2.27	2.41
Total ^{b,d,e}	2.05	1.96	2.39	3.03	3.25
Apparent DMD, % ^b	50.0	51.5	45.1	46.2	48.0
Digested DM, lb ^{c,d}	8.01	8.10	8.95	11.66	12.72

*Dry matter intake expressed in terms of actual lbs consumed and as a % of body weight, Apparent DMD = apparent dry matter digestibility, Digest DM = digested dry matter.

^bPelleting increased intake, and lowered digestibility (P<.01).

^cSupplementation decreased forage intake and increased digested dry matter (P<.10).

^dPelleted Mix increased intake and digested DM above all other treatments (P<.01).

^ePelleted mix increased intake, in terms of % BW, above all other treatments (P<.10).