EFFECTS OF SUPPLEMENTING LIMIT-FED, WHEAT MIDDLING-BASED DIETS WITH EITHER SOYBEAN MEAL OR NON-ENZYMATICALLY BROWNED SOYBEAN MEAL ON GROWING STEER PERFORMANCE

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Summary

Seventy two individually fed Angus × Hereford steers (660 lb) were limit-fed, 16.7% CP wheat middling-based diets with 1.9 or 3.8 percentage units of additional CP from either soybean meal (SBM) or non-enzymatically browned soybean meal (NEBSBM). A limit-fed, rolled corn-based diet (16.7% CP) also was included. Steers were fed once daily for 70 days at 2.25% of BW. The SBM provided 30% bypass protein, and NEBSBM provided 68%. Average daily gain and efficiency improved linearly with increasing level of NEBSBM (P<.05; ADG=2.482 + .106 (increase in % CP); feed to gain=6.26 - .22(increase in % CP)), but not with increasing levels of SBM. Steers fed the wheat middling diets had lower ADG and efficiency than those fed the corn control diet. These data suggest that bypass protein may be first limiting in high-concentrate, limit-fed growing diets composed predominantly of wheat middlings.

(Key Words: Wheat Middlings, Growing Cattle, Undegraded Intake Protein.)

Introduction

Previous KSU research has shown wheat middlings to have feed values of 95% relative to corn and soybean meal when used in full-fed sorghum silage-based rations but of only 83% when used in limit-fed diets. One likely reason for this lower feed value is the low bypass protein value. Non-enzymatically browned soybean meal (Soypass®) is a better source of bypass protein compared to commercial soybean meal. Our objective was to compare the effects of supplementing limit-fed, wheat middling-based diets with either soybean meal (SBM; 30% bypass) or non-enzymatically browned soybean meal (NEBSBM; 68% bypass) on growing steer performance.

Experimental Procedures

Seventy two individually fed Angus × Hereford steers (660 lb) were used in a randomized complete block design to evaluate the effects of supplementing limit-fed, wheat middling-based diets with either SBM or NEBSBM on growing steer performance. Steers were stratified by weight and randomly allotted within strata to one of six treatments. The CP content of a wheat middling-based control diet (16.7%) was increased by 1.9 or 3.8 percentage units using SBM or NEBSBM (Table 1). A limit-fed, rolled corn-based diet (16.7% CP) also was included. Steers were fed once daily for 70 days at 2.25% of BW. Data were analyzed by regression using supplementation level as a continuous variable nested within supplement source (SBM or NEBSBM).

Results and Discussion

Average daily gain (Figure 1) and efficiency (Figure 2) improved linearly with increasing level of NEBSBM (P<.05) but not with increasing level of SBM. With NEBSBM, ADG = 2.48 + .106 (increase in % CP) and feed-to-gain = 6.26 - .22 (increase in % CP). Steers fed the wheat middling diets had lower ADG and efficiency compared to those fed the corn control diet (data not shown). The improved performance with supplemental NEBSBM, but not SBM, indicates that bypass protein may be first limiting in high-concentrate, limit-fed growing diets based on wheat middlings.

Table 1. Compositions of Experimental Diets (% of DM)

	Diet[a]					
Item	MID-CNTRL	SBM-18.6	SBM-20.5	NEBSBM-18.6	NEBSBM-20.5	CORN-CNTRL
Rolled corn	0	0	0	0	0	68
Alfalfa hay	15	15	15	15	15	15
Molasses (cane)	4	4	4	4	4	4
Wheat middlings	77.3	71.7	66.2	69.8	62.4	0
Vitamin/mineral mix[b]	3.7	3.7	3.7	3.7	3.7	0
Vitamin/mineral mix[c]	0	0	0	0	0	3
Soybean meal	0	5.5	11	0	0	10
NEBSBM[d]	0	0	0	7.4	14.8	0

[a]MIDCNTRL=wheat middling control diet (16.7% CP); SBM-18.6, SBM-20.5=soybean meal was used to increase the CP content of the MIDCNTRL diet to 18.6 and 20.5%, respectively; NEBSBM-18.6, NEBSBM-20.5=non-enzymatically browned soybean meal was used to increase the CP content of the MIDCNTRL diet to 18.6 and 20.5%, respectively; CORNCNTRL=rolled corn control diet (16.7% CP).

[b]Formulated for the complete diet to contain 1.6% Ca, .8% P, 1.3% K, 1330 IU/lb added vitamin A, 30 g/ton Rumensin® and 10 g/ton Tylan®.

[c]Formulated for the complete diet to contain .78% Ca, .39% P, .88% K, 1330 IU/lb added vitamin A, 30 g/ton Rumensin®, and 10 g/ton Tylan®.

[d]Non-enzymatically browned soybean meal.

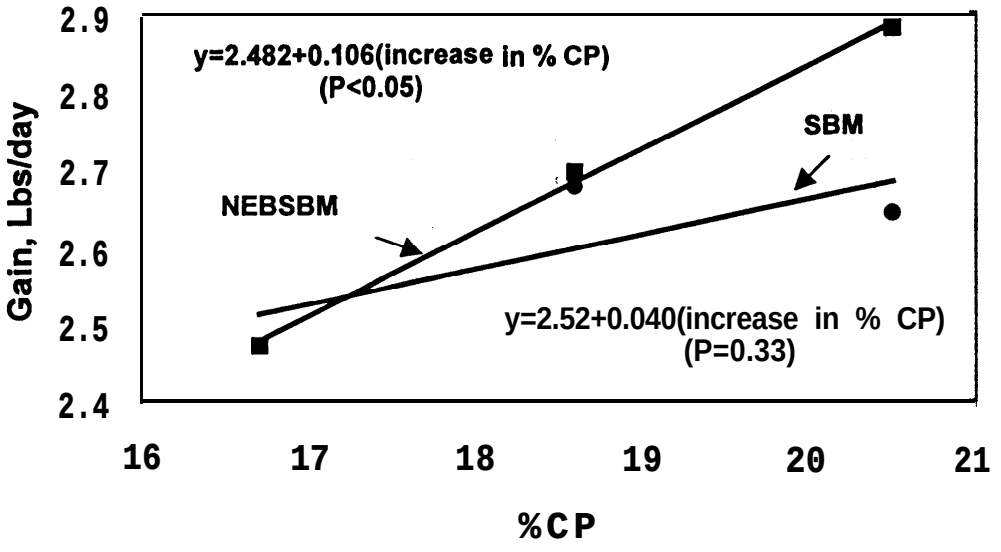

Figure 1. Effect on Daily Gain of Increasing Crude Protein Level of a Limit-Fed, Wheat Middling-Based Diet by Using either Soybean Meal (SBM) or Non-Enzymatically Browned Soybean Meal (NEBSBM).

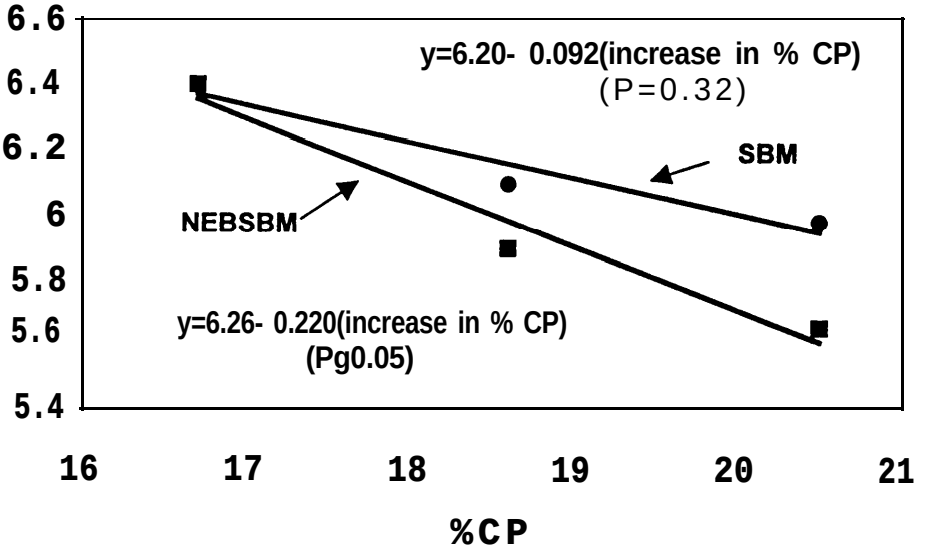

Figure 2. Effect on Feed Efficiency of Increasing Crude Protein Level of a Limit-Fed, Wheat Middling-Based Diet by Using either Soybean Meal (SBM) or Non-Enzymatically Browned Soybean Meal (SBM).