MUNGBEANS AS A PROTEIN SOURCE FOR GROWING-FINISHING SWINE

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Story in Brief

A study involving 482 pigs was conducted to determine the value of mungbeans as a replacement for soybean meal in growing-finishing swine diets. Pigs averaging 38 lbs and from two growth lines were randomly allotted to three dietary treatments consisting of a control corn-soybean meal diet or the control diet with either one-third or two-thirds of the supplemental lysine from soybean meal replaced by mungbeans (10.15 and 20.65 percent mungbeans in the diet, respectively) in the growing period. During the finishing period, 37.5 and 75 percent of the supplemental lysine from soybean meal was replaced (8.59 and 17.88 percent mungbeans in the diet, respectively). Studies to date with mungbeans suggest that the maximum level of mungbeans which can be effectively utilized by the growing pig is between 25 and 33 percent of the supplemental lysine. (7.5 to 10.15 percent of the diet). For the finishing pig, the maximum level appears to be between 5.6 and 8.6 percent of the diet although some sources of mungbeans may be fed at higher levels.

(Key Words: Mungbeans, Protein Source, Growing-Finishing Swine)

Introduction

Mungbeans represent an attractive alternative protein source for growing-finishing swine since they are available to some swine producers and are high in the limiting amino acid lysine. Previous research at Oklahoma State University indicated that mungbeans can replace a portion of the supplemental lysine in growing-finishing swine diets without affecting performance even though anti-nutritional factors or inhibitors have been shown to be present in raw mungbeans. Earlier trials determined that mungbeans can replace up to 25% of the supplemental lysine in the diet of growing swine (50-120 lbs) and up to 50 percent of the lysine in the diet of finishing swine (120-220 lbs) without affecting performance. However, replacing 50 percent of the supplemental lysine in the growing pig with mungbeans depressed performance. The maximum level of mungbeans which can be fed to finishing swine without affecting performance has not been determined. This study was conducted to determine the effect of replacing between 25 and 50% of the supplemental lysine with mungbeans on performance during the growing phase. Replacement levels higher than 50 percent were tested during the finishing phase.

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Materials and Methods

This study was conducted at the Southwestern Livestock and Forage Research Station, El Reno, Oklahoma in the Fall, 1984. A total of 482 pigs from two growth lines, selected for rapid or slow growth, were randomly allotted to three dietary treatments (Table 1). The three treatments during the growing period were: (1) a corn-soybean meal control diet (2) the control diet with one-third of the supplemental lysine supplied by mungbeans at the expense of soybean (10.15% mungbeans) (3) the control diet with two-thirds of the supplemental lysine supplied by mungbeans at the expense of soybean meal (20.65% mungbeans). During the finishing phase, the diets were: (1) the control corn-soybean meal finishing diet (2) the control diet with 37.6 percent of the supplemental lysine supplied by mungbeans at the expense of soybean meal (8.59 percent mungbeans) (3) the control diet with 75 percent of the supplemental lysine supplied by mungbeans (17.88 percent mungbeans). Diets were formulated to contain 0.75 percent lysine during

Table 1. Composition of experimental rations.

	Growing			Finishing		
Ingredients	Control	MB 33 1/3[a]	MB 66 2/3[b]	Control	MB 37 1/2[c]	MB 75[d]
Corn, yellow	76.87	73.28	69.05	82.32	79.21	75.22
Soybean meal	19.53	12.89	6.59	14.61	9.09	3.75
Mungbeans	---	10.15	20.65	---	8.59	17.88
Dicalcium phosphate	1.64	1.74	1.82	1.50	1.58	1.65
Calcium carbonate	.82	.80	.75	.82	.78	.75
Salt	.40	.40	.40	.40	.40	.40
Vitamin trace-mineral mix[e]	.25	.25	.25	.25	.25	.25
Tylan 10	.50	.50	.50	.10	.10	.10
Calculated composition[f]						
Lysine	.75	.75	.75	.62	.62	.62
Calcium	.75	.75	.75	.70	.70	.70
Phosphorus	.65	.65	.65	.60	.60	.60

[a]One-third of the supplemental lysine was supplied by mungbeans.
[b]Two-thirds of the supplemental lysine was supplied by mungbeans.
[c]Thirty-seven and one-half percent of the supplemental lysine was supplied by mungbeans.
[d]Seventy-five percent of the supplemental lysine was supplied by mungbeans.
[e]Supplied 4,000,000 IU vitamin A, 3,000,000 IU vitamin D, 4g riboflavin, 20g pantothenic acid, 30g niacin, 800g choline chloride, 15mg vitamin B_{12}, 10,000 vitamin E, 2g menadione, 200mg iodine, 90g iron, 20g manganese, 10g copper, 90g zinc and 100mg selenium per ton of feed.
[f]Based upon analyzed value for the lysine level in mungbeans.

the growing period and lysine was reduced to 0.62 percent during the finishing period. Mungbeans were ground moderately fine with the same hammermill and screen size used for grinding the grain portion of the diet. Pigs were housed in indoor concrete pens equipped with self-feeders and waterers.

Results and Discussion

The effect of level of mungbeans on performance during the growing period (38 to 118 lb) is presented in Table 2. Even though a line by treatment interaction was observed for average daily gain ($P<.01$), data from both growth lines were combined since the interaction was the result of the magnitude of the response of the two lines to treatment rather than a change in rank of treatment effects between the two lines. Replacing one third of the lysine from soybean meal with mungbeans (10.15 percent mungbeans in the diet) decreased gain 7.5 percent ($P<.01$). The replacement of two-thirds of the supplemental lysine from soybean meal with mungbeans resulted in a reduction in average daily gain of 12.0 percent ($P<.01$) when compared to pigs fed the control diet. Feed intake and feed efficiency were not significantly affected by dietary treatment, although replacing one-third or two-thirds of the lysine from soybean meal with mungbeans reduced feed efficiency by 5 percent and 8 percent, respectively when compared to pigs fed the control diet. These data suggest that the levels of mungbeans fed in this experiment exceed levels which should be included in the diet of growing swine. This is consistent with previous research (Maxwell et al., 1984) and suggests that the maximum level of mungbeans which can be effectively utilized by the growing pig is between 25 and 33 percent of the supplemental lysine (7.5 to 10.15 percent of the diet).

During the finishing period (Table 3), feeding either 8.59 or 17.88 percent mungbeans in the diet (37.5 and 75 percent supplemental lysine, respectively) reduced average daily gain ($P<.01$) by 5.7 and 7.2 percent, respectively. Similarly, slight, but nonsignificant, decreases in average daily feed intake and feed efficiency were observed. This study indicates that the maximum level of mungbeans which can be effectively utilized by finishing swine is less than 8.59 percent of the diet. These data are not consistent with an earlier trial (Maxwell et al., 1984) which indicated that finishing swine could utilize diets with up to 50% of the supplemental lysine coming from mungbeans (11.75%

Table 2. The effect of mungbeans on feed intake, average daily gain and feed efficiency for the growing phase of production.

		Treatment	
Item	Control	MB 33 1/3	MB 66 2/3
Pigs per treatment, no.	136	167	179
Initial weight, lb	39.78	35.97	38.05
Final weight, lb	120.70[b]	119.08[c]	114.17[d]
Avg. daily gain, lb[a]	1.58	1.46	1.39
Avg. daily feed intake, lb	3.97	3.91	3.84
Lbs. feed/lb gain	2.57	2.70	2.78

[a]Line by treatment interaction ($P<.001$).
[b]Means in same row which do not share a common superscript differ ($P<.01$).

Table 3. The effect of mungbeans on feed intake, average daily gain and feed efficiency for the finishing phase of production.

Item	Control	Treatment MB 37 1/2	MB 75
Pigs per treatment, no.	136	167	179
Initial weight, lb	120.70	119.08	114.17
Final weight, lb	223.14	221.39	218.66
Avg. daily gain, lb	1.94[a]	1.83[b]	1.80[b]
Avg. daily feed intake, lb.	6.21	6.10	5.99
Lbs. feed/lb gain	3.34	3.50	3.45

[ab]Means in the same row which do not share a common superscript differ ($P<.01$).

of the diet) without affecting performance. These differences in response between trials may be explained by variation in source of mungbeans for the two trials.

Literature Cited

Maxwell, C. et al, 1984. Okla. Agr. Exp. Sta. MP 116:305.