MUNGBEANS AS A PROTEIN SOURCE FOR SWINE

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Story in Brief

A study involving 470 pigs was initiated to determine the value of mungbeans as a protein source for growing-finishing swine. Pigs averaging 35 lbs initially were randomly allotted to three treatments consisting of a control corn-soybean diet, or the control diet with either 25 or 50 percent of the supplemental lysine supplied by mungbeans. Diets were formulated to contain .75 percent lysine during the grower phase and .62 percent lysine during the finishing phase. Gain and efficiency of gain were measured for both the growing and finishing phase of production. The results of this trial suggest that mungbeans should be limited to no more than 25 percent of the supplemental lysine during the growing phase but can be included in finishing rations to furnish at least 50 percent of the supplemental lysine.

Introduction

The mungbean is a large seeded legume that is an important source of dietary protein for many people in tropical and subtropical countries. Oklahoma is the leading state in mungbean production in the United States with 50,000 to 70,000 acres in production. Mungbeans are grown mostly in a double cropping system with wheat on sandy soils.

In the harvesting and processing of mungbeans for the canning industry, the undersized beans or split-beans are of no economic value and have traditionally been utilized in livestock feeds. In addition, overproduction has at times resulted in a depressed market and considerable interest in feeding the surplus beans to livestock.

Mungbeans contain from 22 to 28 percent crude protein and contain approximately 1.80 percent lysine on a 90 percent dry matter basis. The high lysine content, which is comparable to soybean meal on an equal protein basis, makes mungbeans particularly attractive to swine producers since lysine is the first limiting amino acid in most swine diets. Mungbeans have been reported to contain anti-nutritional factors such as trypsin inhibitors (Gupta and Wagle, 1978), therefore preliminary chick studies were conducted to determine if heat treatment of mungbeans would improve nutritional value. These studies indicated that inhibitory factors were present which depressed chick performance when non heat-treated beans were fed at a high level in the diet. However, performance was unaffected

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when non heat-treated mungbeans were used to supply up to 40 percent of the supplemental lysine. Studies have been initiated to determine the value of mungbeans as a replacement for a portion of the soybean meal in swine diets.

Methods and Materials

Since the initial chick trials indicated that performance was not affected by replacing up to 40 percent of the soybean meal lysine with mungbeans (but produced a decline in performance at higher levels of mungbeans) this trial was conducted to compare performance of pigs fed a control corn-soybean meal diet with pigs receiving up to 50 percent of the supplemental lysine from mungbeans during both the growing and finishing periods.

A total of 470 pigs and 32 pens were used in this trial. A 0.75 percent lysine corn-soybean meal ration (Table 1) was fed to all pigs from an average weight of 35 lb to 123 lb. The lysine level was reduced to 0.62 percent during the finishing phase (123 lb to 223 lb). The three treatments were: (1) a corn-soybean meal control diet (2) the control diet with 25 percent of the supplemental lysine supplied by mungbeans (3) the control diet with 50 percent of the supplemental lysine supplied by mungbeans. A higher percentage of mungbeans in the ration was required to furnish 25 and 50 percent of the supplemental lysine in the growing diet than in the finishing diets since the total lysine level was higher in the growing diets. Pigs were housed in indoor concrete pens equipped with self-feeders and waterers.

Results and Discussion

During the growing period (35 lb to 123 lb) a 4 percent decrease in average daily gain was observed (Linear effect, $P<.05$) as mungbeans were added to the diet in increments of 25 percent of the total supplemental lysine (Table 2). Feed efficiency was not affected by the replacement of 25 percent of the supplemental lysine with mungbeans, but a further increase in mungbeans to a total of 50 percent of the supplemental lysine resulted in a decrease ($P<.05$) in feed efficiency. The addition of mungbeans to the diet had no effect on average daily feed intake. These data suggest that an inhibitor or inhibitors in mungbeans may be interfering with utilization of the diet at higher levels of mungbeans. A diet containing 25 percent of the supplemental lysine from mungbeans or 7.50 percent of the total ration as mungbeans appears to be the maximum amount of mungbeans that the growing pig can utilize effectively.

Unlike the situation in the growing period, during the finishing period (123 lb to 233 lb) pigs appear to be able to utilize higher levels of mungbeans (Table 3). Neither average daily gain, feed efficiency nor feed intake was affected by the addition of mungbeans up to 50 percent of the total supplemental lysine or 11.75 percent of the total diet. These observations are not inconsistent with the

Table 1. Composition of Experimental Rations

Ingredients	Growing			Finishing		
	Control	MB-25[a]	MB-50[b]	Control	MB-25[a]	MB-50[b]
Corn, yellow	77.25	74.44	71.30	82.40	80.08	77.60
Soybean meal	19.63	14.88	10.00	14.63	11.33	7.63
Mungbeans	---	7.50	15.50	---	5.63	11.75
Dicalcium phosphate	1.65	1.73	1.78	1.50	1.53	1.58
Calcium carbonate	0.83	0.80	0.78	0.83	0.80	0.80
Salt	0.40	0.40	0.40	0.40	0.40	0.40
Vitamin trace-mineral mix[c]	0.25	0.25	0.25	0.25	0.25	0.25
Tylan 10	0.50	0.50	0.50	0.10	0.10	0.10
Calculated composition						
Lysine	0.75	0.75	0.75	0.62	0.62	0.62
Calcium	0.75	0.75	0.75	0.70	0.70	0.70
Phosphorus	0.65	0.65	0.65	0.60	0.60	0.60

[a]Twenty five percent of the supplemental lysine was supplied by mungbeans.

[b]Fifty percent of the supplemental lysine was supplied be mungbeans.

[c]Supplied 4,000,000 IU vitamin A, 3,000,000 IU vitamin D, 4 g riboflavin, 20 g pantothenic acid, 30 g niacin, 800 g choline chloride, 15 mg vitamin B_{12}, 10,000 IU vitamin E, 2 g menadione, 200 mg iodine, 90 g iron, 20 g manganese, 10 g copper, 90 g zinc and 100 mg selenium per ton of feed.

Table 2. The effect of mungbeans on feed intake, average daily gain and feed efficiency for the growing phase of production (35-123 lb)

Item	Control	Treatment MB-25[a]	MB-50[b]
Pigs per treatment, no	100	184	186
Initial weight, lb	34.43	36.43	35.18
Final weight, lb	122.05	123.57	124.89
Avg daily gain, lb[c]	1.50	1.44	1.38
Avg daily feed intake, lb	3.81	3.94	3.90
Lb. feed/lb gain	2.67[d]	2.70[d]	2.83[e]

[a]Twenty-five percent of the supplemental lysine was supplied by mungbeans.

[b]Fifty percent of the supplemental lysine was supplied by mungbeans.

[c]Significant linear decrease in ADG with increasing mungbeans ($P<.05$).

[d,e]Means in the same row with different superscripts differ ($P<.05$).

Table 3. The effect of mungbeans on feed intake, average daily gain and feed efficiency for the finishing phase of production (123-233 lb)

Item	Control	Treatment MB-25[a]	MB-50[b]
Pigs per treatment, no	100	184	186
Initial weight, lb	122.05	123.57	124.89
Final weight, lb	222.89	223.96	224.27
Avg daily gain, lb	1.76	1.76	1.81
Avg daily feed intake, lb	6.10	6.12	6.12
Lb feed/lb gain	3.58	3.56	3.58

[a]Twenty-five percent of the supplemental lysine was supplied by mungbeans.

[b]Fifty percent of the supplemental lysine was supplied by mungbeans.

concept that inhibitors may be present in mungbeans since older pigs are able to adjust to larger amounts of inhibitors. These data suggest that mungbeans can be used to replace at least and perhaps more than 50 percent of the supplemental lysine in swine finishing diets.

For the overall growing and finishing periods (35 lb to 223 lb) performance was similar for pigs fed the control diet or diets with up to 50 percent of the supplemental lysine supplied by mungbeans (Table 4). Backfat thickness was also not affected by dietary treatment.

Table 4. The effect of mungbeans on feed intake, average daily gain, feed efficiency and adjusted backfat for the entire growing-finishing phase of production (35-220 lb)

Item	Control	Treatment MB-25[a]	MB-50[b]
Pigs per treatment, no	100	184	186
Initial weight, lb	34.43	36.43	35.18
Final weight, lb	222.89	223.96	224.27
Avg daily gain, lb	1.62	1.59	1.58
Avg daily feed intake, lb	4.93	4.98	4.93
Lb feed/lb gain	3.16	3.15	3.22
Avg adjusted backfat, in[c]	1.06	1.06	1.08

[a]Twenty-five percent of the supplemental lysine was supplied by mungbeans.

[b]Fifty percent of the supplemental lysine was supplied by mungbeans.

[c]Adjusted to 222 lb.

Literature Cited

Gupta, K. and D.S. Wagle. 1978 J. Biochem B. 15(2):63.