RAW MUNGBEANS AS A PROTEIN SOURCE FOR GESTATION DIETS

C.V. Maxwell,[1] , D.S. Buchanan[2], W.G. Luce[1], Rex Vencl[3], M.D. Woltman[4] and G.N. Dietz4

Story in Brief

A study involving 258 gilts was conducted to determine the value of mungbeans as a partial replacement for soybean meal in swine diets during gestation. Gilts from two growth lines were fed either soybean meal or a combination of soybean meal and mungbeans (each providing 50% of the supplemental lysine) as a protein supplement for sorghum grain based diets during gestation. No effect of dietary treatment on weight gain of gilts or subsequent litter or pig birth weight was observed. Although the effect of feeding mungbeans was minimal, survival rate from birth to 21 days tended to be lower for gilts fed mungbeans and litter size was reduced in the slow growth line, but not the rapid growth line gilts fed mungbeans. This study suggests that only minimal effects will occurr when mungbeans are used to replace one-half of the supplemental lysine in gestating swine diets.

(Key words: Mungbeans, Protein Source, Gestation Diets)

Introduction

Raw mungbeans should represent an attractive alternative protein source for swine during gestation since they are high in the limiting amino acid lysine and are available to many Oklahoma swine producers. In addition, studies with raw soybeans suggest that older swine may be less susceptible to inhibitors present in legume seed than growing-finishing swine. However, in a recent study, a diet containing a level of 19.80 percent mungbeans was found to adversely affect weight gain and subsequent lactation performance in gilts. This study was conducted to compare the reproductive performance of gilts fed sorghum grain based gestation diets in which the supplemental protein was supplied by soybean meal or a reduced level of raw mungbeans and soybean meal. Mungbeans were included in the diet at a level calculated to supply one-half of the supplemental lysine.

Materials and Methods

This study was conducted at the Southwestern Livestock and Forage Research Station, El Reno, Oklahoma in the 1985 spring and fall and 1986 fall farrowing seasons. A total of 258 crossbred gilts was randomly allotted from two lines selected for rapid or slow growth to two dietary treatments (Table 1). Treatments were: 1) a sorghum grain based gestation control diet in which supplemental lysine was supplied by soybean meal and 2) the control diet with one-half of the supplemental lysine supplied by mungbeans at the expense of soybean meal (11.51% mungbeans). Mungbeans were ground moderately fine with the same

---

[1]Professor [2]Associate Professor [3]Herdsman [4]Graduate Student

Table 1. Compositon of experimental diets.

Ingredient	Gestation Diet Control	Gestation Diet Mungbean	Lactation Diet
Sorghum grain, ground	81.22	76.63	77.84
Soybean meal, 44%	14.39	7.30	17.82
Ground mungbeans	---	11.51	---
Dicalcium phosphate	1.76	1.86	1.68
Calcium carbonate	1.04	1.01	1.07
Salt	.34	.34	.34
Vitamin-trace mineral mix[a]	.25	.25	.25
Chlortetracycline[b]	1.00	1.00	1.00
Calculated composition			
Protein, %	13.64	13.14	14.85
Lysine, %	.62	.62	.68
Calcium, %	.84	.84	.84
Phosphorus	.63	.63	.63

[a]Supplied 800,00 IU Vitamin A, 80,000 IU Vitamin D, 3,400 IU Vitamin E, 800mg riboflavin, 4,000 mg pantothemic acid, 5,400 mg niacin, 4 mg Bitamin B12, 660 mg menadione sodium bisulfite, .4% manganese, 3.0% iron, .004% selenium, .008% iodine, .4% copper and 4.0% zinc per lb of premix

[b]Supplied 200 g. chlortetracycline/ton of complete feed.

hammermill and screen size used for grinding the grain portion of the diet. Both diets were started at the initiation of the breeding season.

All gilts were housed in outside dirt lots during gestation and group fed five pounds of feed per head per day. At day 110 of pregnancy, gilts were moved to individual farrowing crates, and litters were penned separately until weaned at 42 days. Gilts were fed a common lactation diet (Table 1) once daily (4.5 lb./day) from the time they were moved into individual farrowing stalls at 110 days of gestation. After parturition, gilts were allowed to consume the lactation diet ad libitum for the duration of the 42 day lactation period. All gilts were weighed at breeding, 110 days of gestation and 42 days postpartum. Pig weights and litter size were recorded at birth, 21 and 42 days of age. Pigs had access to creep feed from 21 to 42 days of age.

Results and Discussion

Weight changes during gestation and the subsequent lactation were similar among gilts fed soybean meal or a combination of soybean meal and mungbean as a protein source during gestation (Table 2). Similarly, the inclusion of 11.5 percent mungbeans in the gestation diet had no effect on individual pig weight at birth, 21 days or 42 days (Table 3). Litter weight at 21 days and at 42 days was also similar between the two treatments. Survival rate from birth to 21 days tended to be lower (P .1) in gilts fed the mungbean diet than in those fed soybean meal although the effect of mungbeans on survival rate was not evident at 42 days.

Table 2. The effect of replacing one-half of the soybean meal lysine with mungbean lysine during gestation body weight changes.

Item	Diet	
	Control	Mungbean
Gilts per treatment, No.	142	116
Wt. change during gestation, lb.	117.3±2.62[a]	120.10±2.83
Wt. change during lactation, lb.	-19.78±3.63	-22.58±4.98

[a]Standard Error.

Table 3. The effect of replacing one-half of the soybean meal lysine with lysine from mungbeans during gestation on pig and litter weight and survival rate.

Item	Diet	
	Soy (N=142)	Mungbean (N=116)
Individual pig wt, lb.		
Birth	3.34 ± .04[a]	3.34 ± .52
21 days	11.02 ± .19	11.14 ± .20
42 days	23.61 ± .43	24.27 ± .47
Litter Weight		
21 days	89.77 ± 2.28	84.91 ± 2.47
42 days	187.61 ± 5.00	182.51 ± 5.42
Survival Rate		
Birth to 21 days[b]	86.88 ± 15.41	83.79 ± 17.82
Birth to 42 days	84.78 ± 15.51	82.58 ± 18.07

[a]Standard error
[b]Treatment effect (P .1)

A line by treatment interaction (P<.05) for litter size at birth, 21 days and 42 days and litter weight at birth was detected, therefore results are presented within line (Table 4). The rapid growth line probably represents gilts more typical of those found in the commercial swine industry. Litter size at birth, 21 days and 42 days tended to be greater in rapid growth line gilts fed mungbean than in those fed the soybean meal based diet although these differences were not significant. Litters from slow growth line gilts, however, were larger (P<.01) at 21 and 42 days in gilts fed the soybean meal diets. No apparent explanation for this magnitude of difference between lines is evident. Litter weight at birth followed a similar pattern as observed for litter size although no significant treatment effect was observed within line.

Previous research at Oklahoma State University (Maxwell et al., 1986) indicated that feeding mungbeans at a level of 19.80 percent of

Table 4. The effect of replacing one-half of the soybean meal lysine with lysine from mungbeans on litter size and litter weight.[a]

	Rapid growth line Treatment		Slow growth line Treatment	
Item	Soy	Mungbean	Soy	Mungbean
Gilts per treatment(N)	93	76	49	40
Litter Size (N)				
Birth	9.37	9.95	9.83	8.57
21 days[b]	7.90	8.11	8.79	7.26
42 days[b]	7.77	7.94	8.50	7.22
Litter Weight, lb.				
Birth	33.40	33.50	30.49	27.47

[a]Line X treatment interaction (P .01)
[b]Treatment effect in slow growth line (P .01)

the diet adversely affected weight gain and subsequent reproductive performance. The current study indicates that with the exception of litter size and litter birth weight in the slow growth line of gilts, weight gain and subsequent reproductive performance was not affected by feeding a reduced level of mungbeans in the diet (11.5%). This study suggests that only minimal effects will occurr when mungbeans are used to replace up to one-half of the supplemental lysine in gestating swine diets.

Literature Cited

Maxwell, C.V. et al., 1986. Okla. Agr. Exp. Sta. MP 118:295.