PERFORMANCE AND CARCASS CHARACTERISTICS OF FINISHING PIGS FED RAW OR EXTRUDED FULL-FAT SOYA BEANS RATIONS IN HUMID LOWLAND TROPICS

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ABSTRACT

Sixteen Landrace x Large White crossbred pigs averaging 56 kg body weight were used in a study to investigate the effects of feeding raw full-fat soya bean (RSB) rations on the performance of pigs in humid lowland tropics. Raw full-fat soya bean was used to replace extruded full-fat soyabean at 33, 67 and 100% in finishing swine diets having 16% C.P. and 2800 kcal/kg ME and fed *ad lib*. ADG was reduced by the addition of RSB to the diets ($P > 0.05$). However, FE was improved ($P > 0.05$) when 67 and 100% RSB were added to the diets. RSB significantly ($P < 0.05$) affected backfat deposition and percent lean cut of the carcass. Other carcass traits were not affected.

Keywords Pig, finishers, Full-Fat Soyabean,

INTRODUCTION

The cost of processing soyabean has further increased the price of extruded full-fat soyabeans, thereby limiting its use in rations for finishing pigs. The use of raw soyabeans in rations for finishing pigs will reduce the problems of processing soyabeans encountered by small scale farmers. This will be advantageous to swine producers that might wish to plant soyabeans to supplement feeding and increase production of their livestock. The possibilities of using raw soyabeans in rations for growing pigs have been reported by many authors (Crenshaw and Danielson, 1985; Daniel, 1985; Pontiff *et al*, 1987). Hanke, *et al*, (1972) indicated that swine cannot utilize raw soyabeans as efficiently as soyabean meal. However, Crenshaw and Danielson (1985) reported that gestating gilts fed with diets

having raw soyabeans as the sole supplemental protein source gained weight and were reproductively as efficient as gilts fed soyabean meal. Responses of finishing pigs have been variable as Combs and Wallance (1969) found raw soyabeans to be comparable to processed soyabean meal for 16 - week old pigs. In contrast, Pontiff *et al*, (1987) found that dietary level as low as 6.4% of raw soyabeans reduced performance. It would seem therefore that pigs are able to tolerate some level of raw soyabeans in their diets (Pontiff *et al*, 1987). It is against this background that this study was conducted to determine a level soyabeans would not adversely affect pig performance and carcass quality.

MATERIALS AND METHOD

Animals and Experimental Design and Diets

16 crossbred Landrace X Large White pigs averaging 55.0 kg body weight were used. They were housed individually in total confinement on concrete floors. A completely randomized design was used in which pigs were allocated to treatment on the basis of weight. The composition of diets used in this study is presented in Table 1.

Chemical and Statistical Analyses

Proximate analyses of the test ingredients were carried out using the methods of AOAC (1984). Trypsin inhibitor activity (TIA) and Urease activity (UA) were determined by the methods of AACC (1969).

All data were subjected to analysis of variance (ANOVA) as described by Steel and Torrie (1980) and significant difference between means assessed by applying Duncan's multiple range test (Duncan, 1955).

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Carcass Measurements

Measurement of carcass traits was carried out on the hot carcasses immediately after slaughter and removal of hair and viscera and after chilling the left half of the carcasses at 0°C in the cold room for 24 hours.

RESULTS

The gross composition of diets used in this study are presented in Tables 1 and 2 while Table 3 shows the performance data of the pigs. Performance was not affected by dietary treatments. Raw Soyabeans inclusion in diet 2 (6.6%) reduced average daily feed intake (ADFI). Subsequent increase in the level of raw materials (RSB) improved ADFI but not significantly. Average daily gain (ADG) was not significantly influenced by the level of RSB in the diets. Raw Soyabeans inclusion in the diets reduced gains and this was pronounced at 6.6% level of inclusion. However, subsequent increase in the level of RSB (13.4 & 23%) showed slight improvement but not to the level of gains attained by the control group. Feed efficiency (FE) was not significantly affected by the level of RSB in the diets. Diets 1 and 4 were similar for FE while diets 3 and 4 showed some improvements. 23% RSB diet was more efficiently utilised ($P > 0.05$) than any other level of RSB.

The results of carcass characteristics are presented in Table 4. There were no significant difference between diets due to the use of RSB except for % fats cuts, backfat thickness and % lean cuts. Backfat thickness was significantly decreased ($P < 0.05$) by 33% RSB diet and was significantly increased ($P < 0.05$) by 13.4% RSB diet. Levels of 0 and 23% RSB diets were similar but significantly different ($P < 0.05$) from 6.6 and 13.4% RSB diets. Percent lean cuts was significantly improved in diet 2 having 6.6% RSB. Diet 4 had the least ($P < 0.05$)% lean yield. Warm dressing percentage and estimated loin eye area were not significantly affected by the diets. The results showed that diets 1 and 4 promoted higher yields ($P > 0.05$) than diets 2 and 3. The same trend was noted for carcass length, (Table 4).

Calculated lysine and methionine levels decreased as the level of raw soyabeans increased in the diets (Table 1). Raw soyabeans used in the study was analysed for trypsin inhibitor activity (TIA) and Urease activity (UA) The results of TIA and UA are presented on Table 2.

DISCUSSION:

This study was aimed at determining the level of raw soyabeans that could be utilized by finishing pigs. This level of raw soyabean, it was hoped, would not compromise performance and productivity of pigs while maintaining healthy physiological status. Results of the study showed that the use of raw soyabean would depress feed intake at all levels of inclusion. This report is similar to the findings of Cooks and Frayley (1987) who observed that there was a general depression in feed intake by pigs fed raw high trypsin soyabean. Raw soyabean inclusion in the diets reduced gains. This was pronounced at 6.6% level of inclusion. However, there were improvements at the subsequent levels (13.4 and 23%). Feed efficiency was improved by 13.4 and 23% RSB diets. Pantiff *et al.*, (1987) showed that 33% RSB replacement of protein supplement in diet reduced gain when compared with the control diet but that there was no further reduction in gain from 67% RSB replacement of protein supplement in the diets. The present study is peculiar in that only 6.6% or 33% RSB replacement of full fat soyabean meal showed depressed gain and feed efficiency. This agrees with the findings of Pontiff *et al.*, (1987) but unlike previous studies (Cooks and Frole, 1987; Hank *et al.*, 1972; Yen *et al.*, 1974; Vandergrift *et al.*, 1983; Crenshaw and Danielson, 1985), the study strongly suggests the use of RSB as the sole supplemental protein for finishing pigs.

The results of carcass characteristics did not show significant difference due to the dietary treatments. However, percent lean cut was significantly higher ($P < 0.05$) at 6.6% RSB inclusion. Estimated loin eye area (LEA) was reduced by the addition of RSB to the diets but not significantly ($P > 0.05$). The

RAW VS EXTRUDED SOYABEAN ON PERFORMANCE OF PIGS

TABLE 1: COMPOSITION OF DIETS BASED ON RAW (RSB) OR EXTRUDED FULL FAT SOYA BEAN (EFFSB)

INGREDIENTS	DIETS			
	1	2	3	4
Corn Meal	45.00	44.00	43.00	44.00
Corn Offal	30.00	30.00	30.00	30.00
EFFSB	20.00	14.40	8.60	-
RSB	-	6.60	13.40	23.00
Bone Meal	2.00	2.00	2.00	2.00
Oyster Shell	1.50	1.50	1.50	1.50
Salt	0.50	0.50	0.50	0.50
Premix ^a	1.00	1.00	1.00	1.00
Total	100.00	100.00	100.00	100.00
Calculated analysis				
Crude Protein (%)	16.00	16.20	16.20	16.20
ME (kcal/g)	2.83	2.81	22.78	2.78
Lysine (g/kg)	7.19	5.97	4.59	2.66
Methionine	2.09	1.09	1.49	1.09

^aPremix supplied the following nutrients/kg of rations; Vit A., 11, 785 I.U Vit D., 1944.3 I.U; Riboflavin, 5.4 mg; pantothenic acid 9.82 mg; Nicotinic acid 24.55 mg; folic acid 0.98 mg; Chloride 4x10⁵ mg; Vit E, 4.911.u; Vit K 2.20 mg, Vit B 0.01mg; Methionine 245.53 mg, Cobalt 1.23 mg; iodine 0.98 mg, Cu 9.82 mg; Mn. 55.0 mg; Zn 49.11 mg; and Fe. 19.64 mg.

TABLE 2: PROXIMATE COMPOSITION AND GROSS ENERGY OF FEED INGREDIENTS

DATE	DM (%)	CP (%)	ASH (%)	EE (%)	CF (%)	NFE (%)	GE (kcal/g)	TIA* (mg/g)	UA**
Corn	99.91	7.04	1.86	4.41	1.32	85.38	3.68		
Corn Offal	90.74	11.07	2.94	3.30	9.16	73.53	3.00		
Fish Meal	93.45	61.18	2.74	19.34	0.85	15.89	3.35		
Extruded Full Fat Soyabean	92.39	36.55	6.49	19.36	6.13	31.47	4.64	8.18	0.19
Raw Soyabean	92.18	31.33	5.61	18.54	5.98	38.54	4.64	19.60	2.03

*TRYPSIN INHIBITOR ACTIVITY

** UREASE ACTIVITY

reduction in carcass weight at 6.6 and 13.4% levels of RSB inclusion in diets could be related to reduced body weight gain (Table 2) and poor feed utilization. The reduced LEA could be related to lowered availability of protein in the experimental diets resulting from trypsin inhibitor activity in RSB. Thus deficiency of one or more amino acids might have occurred. Brown *et al.*, (1974) reported that LEA increased as the level of lysine

increased when adequate diets were fed to pigs. 13.4 and 23% RSB diets were deficient in dietary lysine in this study.

Based on the performance of animals fed RSB as the sole supplemental protein and the carcass quality exhibited by them, the use of raw soyabeans diet for finishing pigs is recommended.

TABLE 3: PERFORMANCE OF FINISHING PIGS FED RAW OR EXTRUDED FULL FAT SOYABEANS

	DIETS				
	1	2	3	4	SEM
Initial Weight (kg)	49.75	50.26	50.00	50.00	
Final Weight (kg)	91.75	90.00	90.00	91.00	
Av. Daily Feed intake (kg)	2.68	2.14	2.70	2.23	0.30
Av. Daily Gain (kg)	0.83	0.62	0.74	0.82	0.12
Feed Efficiency	3.24	3.24	2.92	2.75	0.54

TABLE 4: CARCASS CHARACTERISTICS OF FINISHING PIGS FED RAW OR EXTRUDED FULL-FAT SOYABEANS

INGREDIENT	DIETS				
	1	2	3	4	SEM
Warm Dressing %	59.10	56.10	56.80	65.10	3.40
Estimated Loin Eye Area (CM ²)	31.45	26.20	23.10	28.35	3.90
% Lean Cuts	74.00 ^b	75.8 ^a	75.40 ^{ab}	73.30 ^b	0.53*
% Fat Cuts	26.00 ^a	24.00 ^b	24.50 ^b	26.70 ^a	2.30*
Backfat Thickness (CM)	3.30 ^{ab}	2.10 ^c	4.00 ^a	3.80 ^{ab}	0.27*
Carcass Length (CM)	73.00	69.00	67.50	73.80	2.65

*Means without common superscripts in horizontal rows are significantly different ($P < 0.05$).

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