Research Article

EFFECT OF VARIOUS LEVELS OF PROTEIN AND ENERGY DIETS ON CROSSBRED T&D PIGS FEED LOCALLY AVAILABLE FEED INGREDIENTS

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ABSTRACT
Pig has a great potential to contribute to better economic return to the farmers. A balanced diet having proper ratio of energy and protein need to be prepared to make the pig farming economical. The present study was carried out on over 30 growing three months old crossbred piglets to evaluate the energy and protein requirement in growing and finishing pigs. Accordingly, five diets were prepared *viz*. T_1(Medium energy (75%) and medium protein diet (18%); T_2(Medium energy (75%) and low protein diet (16.20); T_3 (Low energy (67.50 %) and high protein diet (19.80%); T_4 (Low energy (67.50%) and medium protein diet (18%) and T_5 (Low energy (67.50%) and Low protein diet (16.20%). Average dry matter intake and weekly growth body weight gain were observed to be non-significant among groups.slightly better performance were observed in group 1 followed by 4, 5, 3 and 2.Total body weight gain after 23rd week of experiment were observed to be 62.33, 59.42, 59.88, 59.67 and 59.73 for group 1, 2, 3, 4 and 5 respectively. The overall average daily gain was 380.99±31.09, 369.07±29.46, 371.93±32.61, 376.27±45.49 and 371.68±35.25 g per piglets in treatments 1, 2, 3, 4 and 5, respectively.

INTRODUCTION

Because due to shortage of land, farmers are very critical about fodder or other livestock and pig also. It is at this juncture nutritionists have made attempts to search and exploit the new unconventional and abundantly available agro-industrial/ forest based wastes as unconventional feed ingredients to balance the straw and other poor quality diets, which may be capable to provide them minimum and maximum energy and protein without hampering their biological activity and finally they maintain their body weight, reproduction and production system for optimum requirement. More than 60% deficiency in concentrate feed sources is a threat to the pig industry which compete human for grains. Non availability of by product utilization facility particularly in areas where pig concentration and slaughter is maximum is another from public health point of view for which general public might offer negative views for the growth of pig industry. Pig has a great potential to contribute to faster economic return to the farmers, because of certain inherent traits like high fecundity, better-feed conversion efficiency, early maturity and short generation interval. Pig rearing is one of the most important occupations of rural society especially the tribal masses of India. In India, there is an overall shortage of energy and protein rich feeds and consequently they are costly (Adesehinwa and Ogunmodede, 1995). The choice of including conventional ingredients in swine rations is becoming rather limited. In India, there is an overall shortage of energy and protein rich feeds and consequently they are costly. There is a need to explore economical and alternative feed resources available locally at farmers level. It has been demonstrated that lowering the protein level of feed reduces the energy losses in urine and as heat (Noblet *et al.,* 1987; Qwiniou *et al.,* 1995) according to net energy system proposed by (Noblet *et al.1994)* substitution of dietary protein by fat reduces heat production and increases the net energy value of the feed. However, the net energy system was established using higher crude protein level (19.8% in average) then what is currently needs to be confirmed. There is a need to explore economical and alternative feed resources available locally at farmer's level. Animal feed, which accounts for 70-80% of the cost of total production, is a big constraint in the rearing of pigs. Good nutritive balanced diet is required for faster growth rate and to obtain the maximum weight. Further, a balanced diet with ratio of energy & protein need to be prepared to make the pig farming economical.. The objectives of the current experiment were to determine

the effect of various levels of protein and energy based diet at localized area of Jharkhand with economical for farmers without any harmful affect on cross bred (T&D) pigs .

MATERIALS AND METHODS

The present study was carried out on over 30 growing three months old T&D piglets for a period of 6 months at pig breeding farm, G.V.T.-Krishi Vigyan Kendra, Godda, Jharkhand to evaluate the energy and protein requirement in growing and finishing pigs. Statistical analysis of the data was carried out as per the methods of Snedecor and Cochran (1994). The piglets were divided into following five treatment groups:

Table 1. Group wise energy% and protein% diet

Experimental groups/Treatments	Energy %		Protein%
T_1	Medium energy (75%)	+	Medium protein (18%)
T_2	Medium energy (75%)	+	Low protein (16.2%)
T_3	Low energy (67.5%)	+	High protein (19.8%)
T_4	Low energy (67.5%)	+	Medium protein (18%)
T_5	Low energy (67.5%)	+	Low protein (16.2%)

Preparation of experimental ration

Group T1 (control) diet: A concentrate mixture was prepared which consists of maize, ground nut cake (GNC), wheat bran, fish meal, mineral mixture, common salt and vitamin supplements. They were fed with standard concentrate mixture consisting of conventional feed ingredients as per NRC (1988) feeding standard.

Other group diets: The diets of other group varied in proportion of mainly maize, ground nut cake (GNC), wheat bran and fish meal and mineral mixture.

Table 2. Percent Composition of concentrate rations of piglets

Ingredients	T_1	T_2	T_3	T_4	T_5
Maize grain (crushed)	62.00	65.50	18.00	45.00	32.00
Ground nut cake	20.00	14.50	24.00	20.00	12.00
Wheat brain	10.00	12.00	50.00	27.00	48.00
Fish meal	6.00	6.00	6.00	6.00	6.00
Mineral mixture	1.50	1.50	1.50	1.50	1.50
common salt	0.50	0.50	0.50	0.50	0.50
Total	100	100	100	100	100
Vitamin supplements (g/100Kg)	20.00	20.00	20.00	20.00	20.00
CP % (calculated)	17.80	16.19	19.89	17.94	16.16
TDN %	74.7	74.18	68.50	68.40	69.40
DE(Kcal/Kg)(calculated)	3200	3150	3120	3100	3220

The animals of each group were kept in separate pens offering ad lib feed and sufficient supply of fresh drinking water. Test rations were offered daily at 9:00 A.M. in the morning and same as evening at 4:00 P.M. The left over feed were collected and weighed after 24 hour before offering feed for the next day. Growth performances of piglets up to 6 month of age were recorded at weekly interval. Data were analyzed as per standard procedure Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Chemical composition of various diets

Representative samples of the concentrate mixture, fed to the experimental piglets were analyzed and the values obtained have been tabulated in Table 2. Proximate principles of all concentrate mixture have also been determined and incorporated in Table 2. From the perusal of data it could be observed that concentrate mixture provide energy and protein requirement for growing and finishing pigs and finally utilized by the piglets. However, the variation of energy and protein level among the various groups within limitation of same ingredients without hampering the NRC recommendation for the piglets (Balaji *et al.*, 2006; Church DC, 1991 and Ranjhan *et al.*, 1971). The factor was taken into consideration and accordingly the concentrate mixtures of T_1, T_2, T_3, T_4 and T_5 were formulated in order to make them iso-nitrogenous. Therefore, the crude protein percentage of the five concentrate mixtures varied within the limitation.

Dry matter intake

The percent composition of various concentrate mixtures (Table 1) fed to piglets has been shown in table 3. The average daily dry matter intake of cross-bred piglets of groups T_1, T_2, T_3, T_4 and T_5 as percent of body weight were 3.82±0.34, 4.05±0.56, 3.72±0.31, 3.63±0.29 and 3.95±0.46 (kg)/100kg body weight, respectively. This was almost similar and did not differ significantly from each other. The present findings are in conformity with the findings of Balaji *et al.* (2006), Church DC (1991). Ranjhan *et al.* (1971) and Snedecor and Cochran (1994). The average daily dry matter intakes of the piglets of group's T_1, T_2, T_3, T_4 and T_5 expressed as g/kg live weight or g/kg $W^{0.75}$ were calculate to be 38.20±3.68, 40.25±3.94, 37.31±3.56, 36.44±3.25 and 40.01±3.84, and 117.77±10.28, 121.31±11.34, 115.12±10.12, 112.31±10.01 and 121.59±11.56, respectively. The differences in the average daily dry matter intake expressed either g/kg live weight or $W^{0.75}$were found to be statistically non- significant (P>0.05). Similar results were observed by the scientists Ellis and Nesbit E.S (1958), Noblet *et al.* (1987), Noblet *et al.* (1994), Noblet and Le Goff (2001), Quinion *et al.* (1995) and Ranjhan *et al.* (1971). They observed that different composition in diet in respect of protein and energy diet affects palatability.

Growth performance

The body weight of pigs was recorded at weekly interval. No significant differences were observed among groups at all the periods under study. However, slightly better performance were observed in group 1 followed by 4, 5, 3 and 2.Total body weight gain after 23rd week of experiment were observed to be 62.33, 59.42, 59.88, 59.67 and 59.73 for group 1, 2, 3, 4 and 5 respectively. The overall average daily gain was 380.99±31.09, 369.07±29.46, 371.93±32.61, 376.27±45.49 and 371.68±35.25 g per piglets in treatments 1, 2, 3, 4 and 5, respectively. The ADG of the piglets of group T1 (control) was highest followed by T_1, T_4, T_3, T_5 and T_2 group. But the groups did not differ significantly among themselves. The results are in conformity with the findings of Agarwala (1961), AOAC (1990), Carpenter *et al.* (2004), NRC (1988) and Niba (2005), they observed that different proportion of diet containing different ratio of energy and protein levels may affects growth [performance might be due to better utilization of diet having balanced proportion of nutrients.

Table 3. Chemical composition of experimental ration fed to different treatment groups (percent dry matter basis)

Particulars	T_1	T_2	T_3	T_4	T_5
Dry matter	90.00	90.00	90.00	90.00	90.00
organic matter	91.20	91.40	91.80	91.00	91.60
Crudeprotien	18.81	16.40	20.12	19.25	17.60
Crudefiber	4.00	4.40	5.20	4.60	4.80
Ether extrate	4.90	3.60	5.40	4.80	5.10
Nitrogen free extract	63.49	67.00	61.08	62.35	64.10
Total CHO(carbohydrate)	67.49	71.40	66.28	66.95	68.90
Total ash	8.80	8.60	8.20	9.00	8.40
Ca(calcium)	1.40	1.39	1.40	1.38	1.39
P9 (phosporus)	0.65	0.62	0.60	0.56	0.59

Table 4. Dry matter intake in experimental (T & D) pigs (kg.)

Groups	Body weight (kg)	Metabolic body weight (kg)	Feed (DM) intake			
			Total (kg)	% Body weight (kg)	g/kg live weight	g/kg $W^{0.75}$
T_1(control)	79.25±7.45	26.08±1.45	2.94±0.24	3.82±0. 34	38.20±3.68	117.77±10.28
T_2	76.33±6.89	25.12±2.12	3.10±0.27	4.05±0.56	40.25±3.94	121.31±11.34
T_3	76.80±6.78	25.27±2.56	2.82±0.29	3.72±0.31	37.31±3.56	115.12±10.12
T_4	76.58±5.87	25.19±1.54	2.75±0.24	3.63±0.29	36.44±3.25	112.31±10.01
T_5	76.67±5.69	25.22±1.24	2.96±0.21	3.95±0.46	40.01±3.84	121.59±11.56

Table 5. Average weekly body weight of the experimental piglets (kg.)

Period (weekly)	T_1	T_2	T_3	T_4	T_5	F Value	CD Value at 5%
Initial	16.91±0.60	16.91±.72	16.92±0.56	17.00±0.52	16.83±0.80	1.21	NS
8th	37.50±2.50	36.08±2.10	35.58±2.12	35.58±2.02	33.58±2.23	0.82	NS
16th	58.58±4.20	54.50±3.50	53.58±3.6	56.25±3.70	54.92±3.40	1.64	NS
23th	79.25±7.45	76.33±6.89	76.80±6.78	76.58±5.87	76.67±5.69	1.04	NS
Total gain in 23thweek	62.33±6.28	59.42±5.44	59.88±5.68	59.67±5.22	59.73±5.02	1.24	NS
Average gain/week	2.72±0.59	2.58±0.46	2.61±0.53	2.62±0.21	2.60±0.56	1.24	NS
Average daily gain (GM)	**380.99 ± 31.09**	**369.07 ± 29.46**	**371.93 ± 32.61**	**376.27 ± 45.49**	**371.68 ± 35.25**	**1.25**	**NS**

NS =Non –Significance

Table 6. Average weekly weight gain (kg) of experimental piglets

Period (weekly)	T_1	T_2	T_3	T_4	T_5	F Value	CD Value at 5%
1st	1.76±0.11	1.34±0.16	2.08±0.19	2.00±0.22	2.09±0.32	0.23	NS
4th	1.08±0.42	0.51±0.06	1.00±0.13	1.58±0.25	1.58±0.28	0.84	NS
8th	2.50 ±0.50	3.25±0.29	1.58±0.26	1.50±0.19	1.75±0.42	1.26	NS
12th	3.00±0.26	2.25±0.36	1.66±0.16	1.92±0.24	2.58±0.39	1.04	NS
16th	3.00±0.62	2.25±0.61	1.00±0.16	1.42±0.24	0.92±0.09	1.24	NS
20th	4.13±0.59	2.17±0.45	4.10±0.62	2.17±0.56	1.83±0.29	1.20	NS
23th	2.00±0.38	3.25±0.61	3.40±0.49	3.58±0.98	1.92±0.52	1.58	NS
Total gain in 23thWEEKS	62.33±6.28	59.42±5.44	59.88±5.68	59.67±5.22	59.73±5.02	1.24	NS
Average gain per week	**2.72±0.59**	**2.58±0.46**	**2.61±0.53**	**2.62±0.21**	**2.60±0.56**	**1.24**	**NS**
Average daily gain (gm)	**380.99±31.09**	**369.07±29.46**	**371.93±32.61**	**376.27±45.49**	**371.68±35.25**	**1.25**	**NS**

NS =Non –Significance

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