

Effect of Different Sources of Protein on Growth and Reproductive Performances of Rabbits

J. Roy¹, N. Sultana¹, Z. Khondoker¹, A. Reza¹ and S. M. J. Hossain²

¹Department of Animal Nutrition, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

²Department of General Animal Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

Abstract: Twenty-four New Zealand white crossbred growing rabbits (Aged 120 days) were used to study the effect of different protein sources on growth and reproductive performances of rabbit does. The animals were fed three diets containing til oil cake (A), soybean meal (B) and gram (C) along with *ad-libitum* green grasses. However daily live weight gain was higher in gram containing diet but not significant ($P > 0.05$) than those received til oil cake or soybean meal. Daily live weight gain of rabbits was 2.34, 2.33 and 3.14 g/day for til oil cake (A) Soybean meal (B) and gram (C) respectively. Feed conversion ratios were differed significantly ($P < 0.05$) among the three treatment groups. Age at first breeding, age at first kidding gestation period, litter size, number of litter alive, number of litter dead and percentage alive were not differed significantly ($P > 0.05$) among the treatment groups. Only kit mortality up to 7 days were differed significantly ($P < 0.05$). Lower kit mortality (12.51) in gram containing feed (C) and increased in group B (36.37) and group A diet (36.37) respectively. Based on the present research findings gram diet may be used as a protein supplement for raising rabbits in Bangladesh. But further research is needed using large number of rabbits in this aspect before final recommendation.

Key words: Rabbit, protein source, growth, reproduction

Introduction

Rabbits are herbivores and can be successfully raised on diets that are low in grains and high in roughage (Cheeke, 1986a). Rabbits have a number of specific characteristics such as small body size, short generation interval (28.32 days), rapid growth rate (Cheeke, 1986b), the poor and unbalanced quality of forage based diets, usually provided to rabbits in developing countries was described by Cheeke *et al.*, 1985; Deshmukh and Pathak, 1995. Rabbit meat is acknowledged as of high quality being high in protein and low in fat cholesterol (Jones, 1990; Handa *et al.*, 1995). It has been reported that growing rabbits can be maintained satisfactorily on diets consisting of 100-200g green roughage and 40-60g concentrate mixtures preferably in the form of pellet (Ranjhan, 1980) for optimum production and about 4 months are required to produce a 2 kg market rabbit under subsistence condition (NRC, 1991).

There is an increasing interest in the diversification of animal production system in Bangladesh to produce products which are not surplus nationally. Therefore, production of meat from rabbit is one such enterprise which has recently attracted attention for development. The climatic condition, commercial factors, legal environment, religious, social practices and technological aspects support the rabbit raising potential in Bangladesh (MIDAS, 1992). Nutrition is a major constraint for rabbit rearing in Bangladesh. Supplementation of soybean meal as a source of protein has been suggested on growth and reproductive performance of rabbit (Rahim *et al.*, 1997). Information regarding rearing rabbits on different source

Table 1: Ingredient and chemical composition of green grass and different concentrate mixture

Ingredients	Dietary group		
	A	B	C
Green grass	<i>Ad-libitum</i>	<i>Ad-libitum</i>	<i>Ad-libitum</i>
Wheat	59.85	59.48	34.48
Wheat bran	25.00	30.00	30.00
Til oil cake	15.00	-	-
Soybean meal	-	10.00	-
Gram	-	-	35.00
Embavit WS	0.02	0.02	0.025
Common salt	0.50	0.50	0.50
Chemical composition (%)			
Dry matter	90.05	89.87	89.35
Crude protein	16.22	16.11	16.13
Crude fibre	4.57	4.46	4.67
Ether extract	4.32	4.76	4.14
Nitrogen free extract	69.05	69.18	69.94
Ash	5.82	5.09	4.9
Calcium ¹	0.39	0.10	0.14
Total phosphorus ²	0.69	0.65	0.53
ME kcal/100g DM ³	26.01	26.53	26.13

^{1,2,3}calculated from the manual of selected topics in Animal Nutrition by Close and Menke (1976)

of protein in Bangladesh is scanty. The present experiment was therefore, designed to compare the effect of supplementing til oil cake, soybean meal and gram on growth and reproductive performances of rabbits fed *ad-libitum* green grasses.

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Table 2: Effect of feeding three different sources of protein on growth performance of rabbits

Parameters	Dietary group H			Level of significance
	A	B	C	
Initial live weight (kg)	1.77± 0.11	1.93± 0.9	1.86± 0.13	-
Final live weight (kg)	2.04± 0.17	2.25± 0.2	2.29± 0.14	-
Daily live weight gain (g)	2.30	2.30	3.09	NS
Feed intake (DM/g) Green grass	33.06	32.92	33.24	NS
Concentrate mixture	60.36	60.86	58.36	NS
Total	93.42	93.78	91.60	NS
Feed conversion ration (DM/LWG)	40.06 ^b	40.7 ^b	29.6 ^a	*

^{ab} Means with difference superscript in the same row differ significantly. * P> 0.05)

Materials and Methods

A total of 18 female and 6 male New Zealand white crossbred growing rabbits, aged 120 days were used to study the effect of different sources of protein on growth and reproductive performance. Eighteen does and six bucks were randomly assigned to three groups, so that each group consisted of six does and two buck. The three dietary treatments consisted of three sources of protein such as til oil cake, soybean meal and gram (Table 1). The three diets were almost iso-nitrogenous and iso-energetic. The diets were compounded in mash form. Green grass and water were provided at *ad-libitum* basis. Experimental rabbits were housed individually in cages with arrangements for separate feeding, watering and left over collection. All animals were treated with a common anthelmintic drug and coccidiostat before starting the trial. Housing and other management practices were kept identical for all groups. Feeds offered and the left over were recorded regularly for individual rabbit. The live weight changes, feed intake and reproductive performance of rabbit does were recorded regularly till the end of the trial. The data on samples of feed offered, residues, live weight changes and reproductive performances were analyzed statistically in CRD following the method steel and Torrie (1980).

Results and Discussion

The average DM intake and live weight changes of rabbits are shown in Table 2. DM intake from green grass was almost similar among the three dietary group. The average DM intake from concentrate mixture was almost similar among the dietary group A and B but DM intake of dietary group C was lower than others two group. The total DM intake (g/d) were 93.42, 93.78 and 91.6 for dietary group A, B and C respectively. The lower dry matter intake was observed in group C having gram as protein source and lower compared with other groups (A and B). Highest daily growth rate was recorded for dietary group C (3.09 g, used gram as protein source) than those two group. Growth rate was similar for dietary group A & B (2.30g and 2.30g used til oil cake and soybean meal used respectively). Rahim *et al.* (1997) found a growth rate of 6.5 g/day with soybean meal and

6.40g/day with whole gram. However, Cheeke and Amberg (1972) found a growth rate of 34 g/day with soybean meal and 25g/day with cotton seed meal. However, Solarte (1989) reported a growth rate of 11.5g/day in New Zealand white rabbits when fed can juice and erythrina foliage and Farinu (1994) found 15.2g/day using compound diet containing 30 percent soybean meal. All findings are higher than the present study. The differences in growth rates of rabbits may be due to variations in their genotypes, feeding and management between the studies.

Feed conversion efficiency of the rabbits that received till oil cake (group A), soybean meal (group B) and gram (group C) were 40.06, 40.7 as 29.94 g/d respectively (Table 2). Feed conversion efficiency was similar for dietary group A and B that was significantly P> 0.05 different from received gram diet (group C) and persisted this trend throughout the study.

Reproductive characteristic of does are shown in Table 3. Age at first breeding that might be one of the most important measures for reproductive performance was 167.66 (A), 169 (B) and 164.5 day (C). The age at first kidling was recorded as 202.3 days for dietary group A, 202.0 for dietary group B and 201.0 days for dietary group C and was not differed significantly (P> 0.05) with each other. Rahim *et al.* (1997) was recorded that age at first kid ling was recorded as 198 days for soybean meal and 183 days for whole gram. The average gestation period was 42.0 (A), 31.7 (B) and 28.3 days for diets A, B and C respectively and was not differed significantly (P> 0.05). The litter size at birth was not differed significantly (P> 0.05) among different treatment (Table 3), litter size at birth mostly depends upon the ovulation rate (i.e the number of ova shed from ovary at a time). Herbert (1998) stated that litter size at birth and weaning was not affected by feeding diets with different sources of protein. Similar results were found in this study. Average number of litter alive was lower in dietary C (0.4) then the dietary group B (2.4) and A (2.3). Kit mortality (1 to 7 days) of dietary group A was significantly (P> 0.05) higher (87.5) compared with those given diet B (36.37) and C (12.5) (Table 3). It was shown from this study, the lowest kit mortality (12.5%) was in group C received

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Table 3 : Effect of different sources of protein on reproductive performance of rabbits

Parameters!	Dietary group#			Level of significance
	A	B	C	
Age at first breeding (days)	167.66	169.0	164.0	-
Age at first kidling (days)	20.3	202.0	201.0	-
Gestation period (days)	42.0	31.7	28.3	NS
Litter size (number)	2.7	3.7	2.7	NS
Number of litter alive	0.4	2.4	2.3	NS
Kit mortality (1 to 7 days)	87.5 ^c	36.37 ^b	12.5 ^a	*

^{abc} Means with different superscript in the same row differ significantly, * P> 0.05

gram as protein sources. Rahim *et al.* (1997) found that kit mortality (50 vs 33.5%) in fed whole gram compared soybean meal that result was higher gram containing feed. In case of soybean meal, present result partially support Rahim *et al.* (1997).

It is observed that feeding of gram to rabbits resulted in a higher growth rate, better feed conversion efficiency, lower gestation period and lower kit mortality than those of fed diet containing til oil cake and soybean meal as protein sources. Therefore, supplementation of gram as protein source may be used for production of rabbit fed *ad-libitum* green grass. However, further studies with a greater number of animals are required to develop rabbit production systems using the three protein supplement

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