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Effect of concentrate supplementation on reproductive performance of rabbit does and litter performance during pre-weaning period under rural conditions

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Abstract

The experiment was conducted under rural condition over a period of October, 2001 to February, 2002 to see the effect of concentrate supplementation on the reproductive performances of meat type rabbit. Sixteen female New Zealand White crossbred aged about 3.5 to 4.5 months, weighing on average 9.5 to 13.0 kg were assigned randomly into two feeding regimes, T_1 (farmers own diet) and T_2 (farmers own diet + concentrate 75 g/day) with four replications, in a complete randomized design (CRD). All animals had free access to the locally available green grass. The percent of does kidded, gestation period, litter size and individual kit weight at birth were similar ($P>0.05$) irrespective of level of treatments. The litter weight (g) and individual kit weight (g) at weaning, daily average weight gain of kit and kit mortality up to weaning differed significantly ($P<0.01$) and the mean values were 969.30±99.13 vs. 427.11±105.97, 408.12±3.85 vs. 310.62±3.56, 352.62±2.65 vs. 255.75±2.76 and 26.92±10.70 vs. 45.00±10.07 for T_2 and T_1 groups, respectively. These results reveal that supplementation of concentrate (75 g/d) in addition to adlibitum green grass may improve reproductive performance of rabbit under rural condition.

Keywords: Rabbit, Concentrate supplementation, Reproductive performance, Litter performance

Introduction

Meat production from different sources like, cattle, buffalo, goat, sheep and poultry is quite insufficient to meet-up the growing demand of animal protein. So, it is necessary to explore some other sources of animal protein to minimize the deficiency of protein for the trimming millions. Rabbit, an important micro livestock (Vietmeyer, 1985) may be considered as a promising source of protein in this regard. A substantial increase in the supply of animal protein from this sector may play a vital role in the national health program. Moreover, this sector has a potential to turn into a viable commercial sector which can be exploited as an additional source of income generation for the landless rural poor farmers. Small scale rabbit projects have been gaining more international attention as a feasible measure for poverty alleviation (FAO, 1996). Rabbit meat is acknowledged as high quality animal protein as it is low in fat and cholesterol (Jones,1990 and Handa *et al.*, 1995). On the other hand, skin of rabbit may be used in the production of toys, craft work and also in cottage industries. Rabbit occupies a vital midway between ruminants and monogastric animals. It can effectively utilize cellulose-rich feed with a ration containing as little as 20% of grain only. Simple biological characteristics, short breeding cycle, high prolificacy and better feed conversion efficiency logically place it, immediately after chicken and turkey as the best animal protein machine (Auriol, 1986). Therefore, the present research was undertaken to observe the effect of concentrate supplementation on reproductive performances does and litter performance during pre-weaning period of rabbit under rural condition.

Materials and Methods

The experiment was conducted at the farmers homestead in Lokkikhola village at Muktagacha Upazilla in Mymensingh district with the help of local NGO named "Jalal Nagor Development Project (JNDP)". Eight male and sixteen female crossbred New Zealand White rabbit aged about 3.5 to 4.5 months and weighing on average 9.0-13.0 kg were selected to conduct the experiment. All animals were assigned into two treatment groups i.e. T_1 (farmers own diet) and T_2 (farmers own diet + concentrate 75g/d) with four replications in a completely randomized design (CRD).

All animals were housed individually in locally made cages (made of bamboo, wood, wire etc.) measuring about 40 cm x 20 cm x 60 cm. Each cage was equipped with a nest box at the time of parturition. The type of nest box varied from farmer to farmer. For feeding and watering, farmers used earthen pot as feeder and drinker. Floor of the room was cleaned with disinfectant in every day. All equipments like feeders, waterers etc. were cleaned regularly in the morning with antiseptic and faeces were taken away to a safety place in order to prevent from diseases. Close observation and careful attention were given during the experimental period to check mortality.

Concentrate mixture (Table 2) was prepared according to NRC recommendation i.e. 16.7% CP and 2700 kcal ME/kg DM. The diet was fortified with vitamin mineral premix, vitamix L at a level of 50 g/20kg diet. Methionine-L was added at a level of 50 g/20 kg diets.Animals were reared into two groups. Control group (T_1) were fed according to farmers choice. Farmers diet includes boiled rice, curry, locally available grasses, pakar leaves, banana leaves and seasonal vegetables i.e. cabbage, leaf stalk of cauliflower, radish etc. Another group (T_2) was fed according to farmers own choice in addition to concentrate mixture at the rate of 75 g/day. This supplement was recommended according to NRC standard for growing rabbit.

After 10 weeks the does were transferred to buck for mating and kept their for 24 hours to confirm pregnancy. Afterwards, the does were returned to their own cages. Just before the time of parturition (27 days) each doe was provided with one nest box. Following parturition, the litter was inspected and weighed regularly. Fertility, gestation period, litter size at birth, litter weight at birth, individual kit weight at birth, litter size at the end of weaning, litter weight at the end of weaning, individual kit weight at the end of weaning, individual kit weight gain up to weaning and kit mortality up to weaning was recorded to measure reproductive and pre weaning litter performances.

Feed samples were analyzed for crude protein content of the concentrate mixture determination in the Animal Nutrition Laboratory at Bangladesh Agricultural University, Mymensingh, followed by the method of AOAC (1984).The data were analyzed statistically following the techniques described by Steel and Torrie (1980) in a Completely Randomized Design (CRD). Significant differences among the treatments were identified using t-test.

Results and Discussion

The results of the reproductive characteristics of does and performance of kits fed diets containing farmers own choice (T_1) and farmer own choice with concentrate supplement (T_2) are presented in Table 3. Percentage of does kidded is one of the most important measures for the reproductive performance. In this study percentage of does kidded were 100 percent

for both T_1 and T_2 groups. The average gestation period ranged from 31.89 to 32.43 days and did not differ significantly ($P>0.05$) between treatment groups. The gestation period of rabbits was in close agreement with Ehiobu et al. (1997) who found 31.8±0.11 days. Omole (1982) also found that gestation period of does was 31.2 days on 18 % CP diet. Longer gestation period, up to 33.7 days were reported when dietary CP content was reduced to 10 %. Litter size mostly depends upon the number of ova production i.e. ovulation rate and also due to embryo mortality before birth. Mortality is partly due to the viability of the embryos and partly to their situation in the uterine horns. External factors also can play a part; the season and the physiological condition of the doe (specially her age). In this study litter size at birth did not differ significantly ($P<0.05$) between the T_1 (2.50±0.29) and T_2 (3.25±0.29) groups. However, litter size differ significantly ($P>0.05$) between T_1 (1.38±0.30) and T_2 (2.38±0.27) group in weaning period. Herbert (1998) stated that litter size at birth and weaning was not affected by different groups of feeding. Similar results were also found in this study except in case of litter size in weaning period. This may be due to farmer's management system and their irresponsibilities. So concentrate supplement in the diet might not have any influence upon prolificacy and gestation period. But Tawfeek (1996) reported that restricted or ad-libitum diet supplemented with enzyme improved ($P<0.05$) litter weight, pre weaning litter weight gain and bunny weight at weaning. Litter weight 137.9 g at birth was significantly ($P<0.05$) lower in does fed treatment T_1 than that of treatment T_2 (180.38g) but individual kit weight, 54.89 g (T_1) and 55.50 g (T_2) at birth was very close between two treatment groups. Lebas (1990) and Yono *et al.* (1986) also reported heavier individual kit weight as a result of smaller litter size. But in this study litter weight at weaning was found as significant ($p<0.010$) variation between T_1 and T_2 groups. Litter weight at weaning was as 427.11±105.97g in T_1 and 969.30±99.13g in T_2 group and individual kit weight at weaning was 310.63±3.56g in T_1 and 408.13±3.85g in T_2 group, respectively. Yono *et al.* (1986) and Sanchez *et al.* (1985) found non significant differences in litter size and litter weight at 28 days of weaning. But Herbert (1998) found low feed intake during lactation which was associated with poor milk production by does as reflected in the litter weights on day 28. Ayyat *et al.* (1996) reported that does fed 18.4% CP diet had higher litter size and litter weight at weaning than those fed 16.3% CP diet. Reddy and Moss (1981) reported higher weaning weights for litter fed higher CP diet (18%) than lower CP diets (16 and 17 %). Significant differences ($P<0.01$) was observed between the treatment groups in this study in case of individual kit weight gain (g) up to weaning in T_1(255.75±2.76 g) and T_2 (352.63±2.65 g) group. This may be due to inadequate milk production of does given diet based on only locally available grasses or rice etc. As the diet in T_1 was very low in energy and protein, does can not reach maximum milk production because it does not fulfill her maintenance requirements. Ayyat *et al.* (1996) found that supplementation of does diet with 0.1% Lacto-Sacc increased litter size, weight at 21 and 28 days and total milk yield. Kit mortality was higher in T_1 (45.00%) group than in T_2 (26.92%) group but did not differ significantly ($P<0.05$).

Table 1 Design of experiment

Treatments	Initial live weight of rabbit (g)*				Average (g)
	R_1	R_2	R_3	R_4	
T_1	1260.0	976.6	993.3	993.3	1055.8
T_2	1033.3	1100.0	946.6	900.0	995.0

* Average of 3 rabbits
T_1= Farmers own diet
T_2=Farmers own + concentrate mixture (75 g)

Table 2 Ingredients and nutrient composition of concentrate mixture

Ingredients	Amount (%)
Maize	35
Wheat	25
Wheat bran	15
Til oil cake	15
Soyabean meal	9.5
Common salt	0.5
Vitamin premix	0.25
*L-Methionine	0.15
Nutrient composition (g/100 g DM)	
Crude protein	16.73
ME (Kcal/kg DM)**	2698.5
Ca**	0.37
P**	0.23

* Rhone-Poulenc Agrovet Bangladesh
** NRC- recommendation

Table 3. Effect of concentrate supplementation on reproductive performances of rabbit does and litter during pre-weaning period

Parameters	Treatment groups #		Level of significance
	T1	T2	
% of does kidded	100	100	NS
Gestation period (days)	32.43+0.49	31.89+0.49	NS
Litter size at birth	2.50+0.29	3.25+0.29	NS
Litter weight at birth (g)	137.19^{b}+16.37	180.38^{a}+16.37	*
Litter size at weaning	1.37^{b}+0.30	2.37^{a}+0.27	*
Litter weight at weaning (g)	427.11^{b}+105.9	969.30^{a}+99.13	**
Individual kit weight at birth (g/d)	54.87+0.96	55.50+0.96	NS
Individual kit weight at weaning (g/d)	310.62^{b}+3.56	408.12^{a}+3.85	**
Individual kit weight gain up to weaning (g/d)	255.75^{b}+2.76	352.62^{a}+2.65	**
Kit mortality up to weaning (%)	45.00^{a}+10.07	26.92^{b}+10.70	NS

[ab] Means with different superscripts in the same row differ significantly
NS = Not significant, * = Significant at 5 % level, ** = Significant at 1 % level
T_1 = Farmers own diet (boiled rice, curry, locally available grasses, pakar leaves, banana leaves and seasonal vegetables etc.)
T_2 = Farmers own diet + concentrate mixture (75 g)
= Average of 8 rabbit does

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