

STUDY OF THE DIETARY ENERGY AND PROTEIN CONTENT FOR GROWING REX RABBITS FROM WEANING TO MARKETING

REN K. L.¹, LI Y. P.¹, HU Y. S.², LIANG Q. Z.¹, LUO H. D.¹

¹Institute of Animal Husbandry and Veterinary Sciences,
Shanxi Academy of Agricultural Sciences, Taiyuan 030032, China.

²Agriculture Bureau in Yangquan, Yangquan043055, China

ABSTRACT

In present experiment 132 weaned rabbits of 35 day or 45 day old were used to study the nutrition requirements of growing Rex rabbits from weaning to marketing. They were divided into four groups and fed one of the 4 experimental diets: low energy high protein (10.97 MJ D /Kg, 18.98 % CP), high energy high protein (11.31MJ DE /Kg, 19.36 % CP), high energy medium protein (11.31MJ DE /Kg, 17.37% CP) and low energy medium protein (10.72MJ DE /Kg, 17.40 % CP). Growth performance and hair coat quality was studied till 15-17 weeks of age. Daily gain from weaning to marketing was not significantly different ($P>0.05$). The levels of digestible energy of the diet played a regulating role to the feed intake; and the high level of energy and protein promotes a favorable feed conversion ratio. The high protein low/high energy diets played an effective role to increase the quality of hair coat, while high energy medium protein diet of DE11.31 MJ/KG and CP17.37% was not good for that purpose. In conclusion, two diets, one with DE10.97 MJ/KG and CP18.98% and the other with DE11.31MJ/KG and CP19.36%, showed positive effect to improve quality of Rex rabbit hair coat.

Key words: Rex rabbit, dietary energy and protein, performances, hair quality.

INTRODUCTION

Feed nutrition is of the first important material basis for domestic rabbit farming. It is the key to make the best of rabbit's production ability and has direct relationship to income of the rabbit keeper. In recent years lots of researches have been focused on nutrition requirement for meat-purpose and Angora rabbits and remarkable achievement has been got. Rougeot (France, 1994), Klaus (Germany, 1995) and Shiming Liu (China 1994) have given their feeding standards for Angora rabbit (REN K.L *et al.* 2002). Those standards have played important role in meat and Angora rabbit production. However systematic approaches to nutrition requirement for fur purpose rabbit are rather limited

and it is high necessary to supply the lack. At this situation though standards fir meat and angular rabbit are taken as reference in fur-purpose rabbit production, it is far to meet the quality and efficiency goals. Present study on nutrition requirement for growing Rex rabbit is one of the sub-topics in the program of “Approaches to Standard of Fur Rabbit Nutrition and Its Compound Feed” and try to define the adequate DE/DP rate in growing rabbits.

MATERIALS AND METHODS

Animals

Present study was conducted in two phases at the Experimental Rabbit Farm of the Institute of Animal husbandry and Veterinary Science, Shanxi Academy of Agricultural Sciences. Rex rabbits in favorable body condition at the similar age from 35-45 days were applied in the experiment. In experiment 1 the average initial age for the applied rabbit was 45 days and in experiment 2 the average initial age was 35 days.

Diets

The feed applied in the experiment is formation of corn, wheat bar, bean meal, alfalfa meal, peanut shell meal and calcium monophosphate, salt and trace elements. The nutrition values for all feed stuff material were tested and 4 groups were divided according to levels of energy and protein as high energy high protein, low energy high protein, high energy medium protein and low energy medium. The nutrition levels of these diets are shown in Table 1.

For all rabbits in each experimental groups ear tattoo was made and the condition was kept at the same level. The experiment rabbit were kept individually in separate cages with a space of 0.42m³, and regulate time interval and feed supply about 170g without fresh forage and *ad libitum* watering.

The applied growing rabbits in the experiment 1 and 2 were divided into 4 groups and random named as groups of 1, 2, 3 and 4. During the experiment period the same diet was supplied with no any changes or supply of fresh forage.

Measuring items are the following as initial and final weight, daily intake, and body weights in every week during the experiment, and hair coat grade at the end of the experiment. The hair coats are graded as 100%, 80% or 50% based on skin size and quality, coat thickness/evenness and color purity/unity and get the mean score through grade weighting.

Table 1. Nutrition levels for the experimental groups.

Nutrient	Group 1	Group 2	Group 3	Group 4
Digestible energy (MJ/Kg)	10.97	11.31	11.31	10.72
Crude protein (%)	18.98	19.36	17.37	17.40
Crude fiber (%)	11.95	11.06	13.87	13.79
Crude ash (%)	8.36	8.20	8.35	9.66
Calcium (%)	1.01	1.00	1.07	1.19
Phosphorous (%)	1.28	1.21	1.18	1.34
Lysine (%)	1.11	1.03	0.94	0.90
Phosphorous amino acid (%)	0.79	0.87	0.73	0.83

Note: Except the calculated values of digestible energy and amino acid, all the rest are the actual values.

Statistical Analysis

All the results were tested with analysis of variance and multiple comparisons.

RESULTS AND DISCUSSION

Effect to daily intake, growth rate and feed conversion ratio.

The results in Table 2 and 3 demonstrate that in the period from the age of 35-day or 45-day to the marketing at age of 5-month the average daily intakes for group 2 and 3 were relatively low and the average daily intake for high energy high protein group 2 was the lowest, while the average daily intake for low energy groups 1 and 4 were fairly high and in group 4 the highest.

The daily intake for high-energy groups was 1.4 to 4.7% ($P < 0.05$) lower than those of the low energy groups. It suggested that the energy levels in the diets play some control role to daily intake. During the whole experimental period, the average daily gain for high energy groups 2 and 3 were lower than in low energy groups of 1 and 4, but the difference was not so significant ($P < 0.05$). It means the nutrition levels for the designed 4

diets in present experiment show no effect to the daily gain for Rex rabbit from the age of 35/45-day to age of 5-month. In addition the feed efficiency for high energy was good and it for low energy poor, as the feed conversion ratios for high-energy groups of 2 and 3 were low and that for group 2 was the lowest, and for low energy groups high. It means again that the levels of energy and protein are associated with feed efficiency.

Table 2. Effect of energy and crude protein levels to the production performance and quality of hair coat for rabbits from the age of 45-day.

Group	n	ILW (g)	LW3 (g)	LW5 (g)	45 day to 3 rd month			45 day to 5 th month		
					DG (g)	DI (g)	FC	DG (g)	DI (g)	FC
1	12	1375±236	2534±254	3129±348	23.7±2.5	126.0±8.9	5.3	16.7±2.1	122.4±9.2	7.3
2	13	1229±145	2368±312	3141±254	23.2±4.5	110.7±17.7	4.8	18.2±2.2	117.2±9.8	6.4
3	13	1202±245	2366±293	3020±265	23.8±2.0	114.7±14.9	4.8	17.3±1.4	119.6±8.9	6.9
4	11	1238±214	2394±214	3057±235	23.6±6.1	124.3±14.9	5.3	17.3±3.0	126.0±9.2	7.3

ILW: Initial live weight; LW3: Live weight at 3rd month; Live weight at 5th month; DG: daily gain; DI: daily intake; FC: feed conversion ratio

Table 3. Effects of energy and crude protein levels to production performances and quality of hair coat for rabbits from age of 35-day.

Group	n	ILW (g)	LW3 (g)	LW5 (g)	35 day to 3 rd month			35 day to 5 th month		
					DG (g)	DI (g)	FC	DG (g)	DI (g)	FC
1	18	851±130	2139±212	2903±240	23.0±3.1	107.2±7.0	4.7	17.2±1.8	116.8±6.5	6.8
2	18	853±126	2185±244	2925±381	23.8±2.2	103.1±10.5	4.4	17.4±2.7	114.8±9.8	6.6
3	20	843±245	2139±206	3061±54	23.2±2.3	106.1±10.0	4.6	18.6±2.3	118.9±9.2	6.8
4	18	854±101	2097±190	2926±254	22.2±2.5	107.7±10.6	4.9	17.4±1.8	120.3±7.3	6.9

ILW: Initial live weight; LW3: Live weight at 3rd month; Live weight at 5th month; DG: daily gain; DI: daily intake; FC: feed conversion ratio

Effects of nutrition level to quality of Rex rabbit hair coat

The results in Table 4 show that high protein groups of 1 and 2, with crude protein around 18.98%~19.36%, they have the highest rates of grade I and II hair coats around 93.3%~87.1%. The average score for group 1 and 2 is as high as 88.0 points and 86.5. While for medium protein groups of 3 and 4, with crude protein 17.40%, they had low ratios of grade I and II hair coats around 69.7%~82.8% and the mean scores for the two are 79.39 and 84.48 respectively. The protein in high energy diet is no effect to quality of hair coat. It means protein level plays an important role to hair coat quality.

Table 4. Effects of energy and protein to quality of hair coat for rabbits at age of 35-day or 45-day.

Group	n	Grade I	Grade II	Grade III	Average score
1	30	15(50.0%)	13(43.3%)	2(6. 7%)	88.0
2	31	16(51.6%)	11(35.5%)	4(12.9%)	86. 5
3	33	14(42.4%)	9(27.3%)	10(30.3%)	79.4
4	29	14(48.3%)	10(34.5%)	5(17.2%)	84.5

Note: the score for grade I is 100 points, grade II 80 and grade III 50.

CONCLUSIONS

Four diets designed on resent experiment with various levels of energy and protein showed no significant effect to the daily gain for rabbits from weaning at the age of 35/45-day to marketing at the age of 5-month ($P<0.05$) and the level of digestible energy showed control effect to the intake of rabbit. And the high level energy and protein is favorable to improve feed efficiency.

The results in present experiment showed that the high level protein, with high or low level energy, is positive to rise ratio of fine hair coat but the protein in high energy diet is negative to such purpose

On the purpose to improve quality of Rex rabbit, the diets with 10.97 MJ DE/Kg + 18.98%CP or 11.31MJ DE/Kg + 19.36%CP are recommended to rabbits from weaning to marketing.

REFERENCES

REN K. L *et al.* 2002. Technology of ration formation for domestic rabbit, *Jindun Publish House*, Beijing.China.