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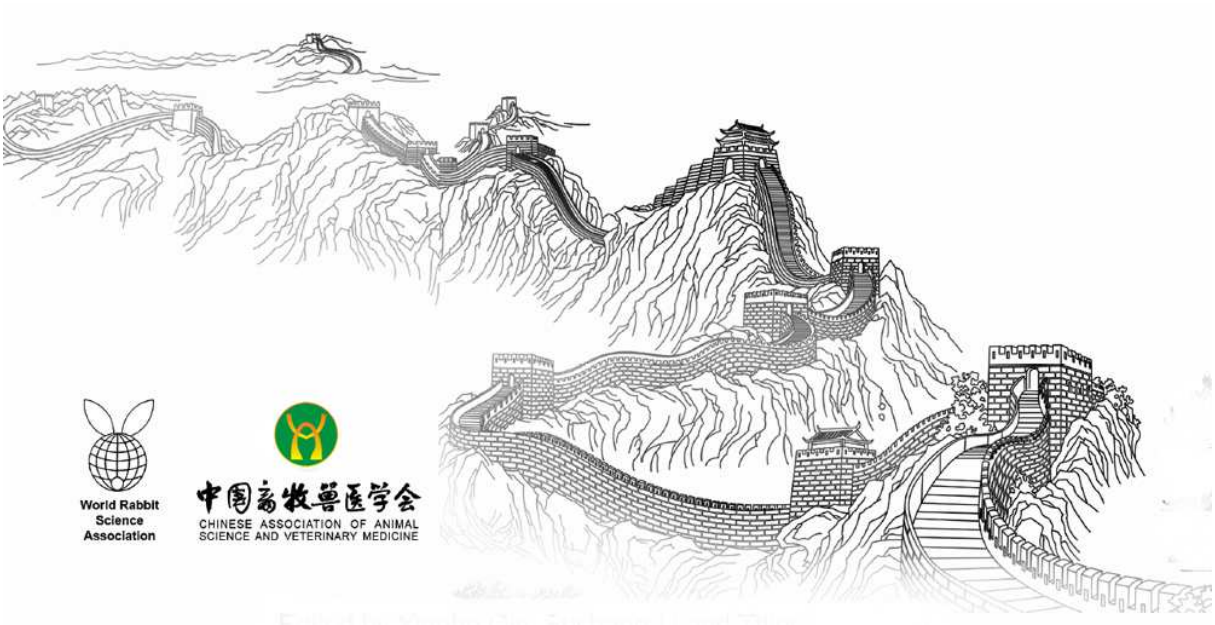

EFFECTS OF MELATONIN ON GROWTH PERFORMANCE AND FUR QUALITY OF REX RABBIT

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ABSTRACT

A single-factor experiment was designed to study the effect of melatonin on growth performance and fur quality of Rex rabbit. 200 healthy growing Rex rabbits at age of 55-60 days were divided at random into 4 groups. Four treatment groups were fed the diets which concluded different levels of melatonin: 0, 10, 25 and 40 mg/kg, respectively. The experiment results showed that: melatonin had no significant effect on growth performance. Adding melatonin can improve the wool density significantly (P<0.01). The effect of melatonin on the pelt thickness was significant. The pelt thickness of groups 2（25mg/kg）and 3（40mg/kg）were significantly thinner than control group (P<0.05). The 150-day buttocks hair density of control group is extremely lower than 130-day hair density of group 2 and group 3 (P<0.01), but has no significant difference with 130-day of group 1(P>0.05).

Key words: Rex rabbit, Melatonin, Fur Quality, Growth performance

INTRODUCTION

Rex rabbit was a typical rabbit for fur. There were some features of the fur, including the fluff was thin, thick, neat, and the coat color was numerous, the fur was soft, warm and so on. According to the growth and the regular pattern of the moult of Rex rabbit, to obtain the high-quality fur which needed the feeding time more than 5-6 months, the weight reached 2.5-2.75kg, so the feeding time was long and the economic efficiency was low.

At the present, the use of melatonin is implants, but adding melatonin in the feed directly was not seen. The objective of the present experiment was to study the effect of melatonin which added in the feed directly on growth performance and fur quality of Rex rabbit could provide a scientific basis for the use of melatonin in Rex rabbit industry.

MATERIALS AND METHODS

Animals and experimental design

The experiment adopted a single-factor design. 200 rabbits at age of 55-60 days were divided into four groups randomly with 50 rabbits in each group. Four treatment groups were fed the diets which concluded different levels of melatonin (0, 10, 25 and 40 mg/kg). At the age of 130 days and 150 days, the hair length and wool density were measured according the methodology proposed by Gu *et al.* (1999).

At the end of the experiment, 8 rabbits were selected (with a weight close to average body weight of group) from each group at random to slaughter. Took the fur, then measured the width, length and calculated its area. The length of the pelt was the distance from the neck cavity to the base of tail, the width of the pelt was the distance from the middle of one side to another side. Scrape the hair from a small part of buttocks, shoulder and belly in the salted pelt separately, then measured the pelt thickness with vernier caliper.

Composition of experimental diets
According to the feeding standard of growing rabbit, formulated the diets after evaluating the nutritional value of feedstuffs and made into pellet whose diameter was 4-6 mm. The premix was formulated to have different levels of melatonin.

Table 1: Composition of the experimental diets (%)

Ingredients (presence or %)		Analytical composition*(%as fed)*	
Corn	22	Crude protein	16.68
Wheat bran	14	Crude fibre	15.61
Soybean meal	16	Crude ash	5.38
Alcohol protein	6	Ca	1.21
Cottonseed meal	2	P	0.54
Rapeseed meal	2	NDF	49.55
Peanut shell	5	ADF	17.36
rice straw	20		
Alfalafa meal	5		
Pine needle powder	3		
CaHPO4	0.3		
limestone	2.2		
Zeolite	1		
NaCl	0.5		
Premix[1]	1		

[1]The premix provided following per kilogram of diet: VA 6 000 IU; VD3 1 000 IU; VE 40 mg; Lys 2.0 g; Met 1.0 g; Cu 50 mg; Fe 50 mg; Zn 50 mg; Mn 10 mg; Melatonin (0, 10, 25, 40mg).

Statistical analysis
Analyses were performed using ANVOVA analysis with SPSS (version 19.0) and differences between means were compared by Duncan's least significant difference at 95% confidence.

RESULTS AND DISCUSSION

Growth performance of experimental rabbits
Table 2 showed that melatonin has no significant effect on growth performance of Rex rabbit (P>0.05), but the ADG of experimental group rabbits has the higher trends than control group.

Table 2: Growth performance of experimental rabbits

Group	initial weight (g)	final weigh t(g)	Average daily gain (g)	Feed/gain rate
Control	1604.55±134.61	2612.58±228.87	11.44±2.24	10.92±2.30
1	1558.09±124.69	2660.88±158.45	12.57±1.74	9.81±1.56
2	1608.66±141.55	2684.88±156.13	12.32±1.59	10.05±1.47
3	1588.95±129.61	2670.66±194.07	12.33±1.87	10.06±1.58

NOTE: On one line, with the same letter means are not different at P=0.05, the different capital letters mean extremely significant difference (P <0.01), the different lowercase letters mean significant difference (P<0.05).

Fur quality of experimental rabbits
Table 3 showed that the buttocks hair length of control group is extremely significantly lower than group 2 and 3 (P<0.01), but has no significant difference with group 1 (P>0.05). Control group and other experimental groups has no significant difference on shoulder hair length and belly hair length (P>0.05). The hair density of control group is extremely lower than all the other experimental groups (P<0.01).

Table3: Fur quality testing results of 5-month experimental rabbits (living body)

Group	Hair density（root/cm^2）			Hair length（cm）		
	Buttocks	Shoulder	Belly	Buttocks	Shoulder	Belly
Control	19666.67±750.07^{A}	13093.43±1132.40^{A}	8251.26±581.42^{A}	2.22±0.17^{A}	2.02±0.13	2.00±0.16
1	20598.68±776.64^{B}	14078.95±740.61^{B}	9000.00±739.22^{B}	2.27±0.16^{AB}	2.06±0.14	2.02±0.18
2	20893.29±913.68^{BC}	14539.63±884.96^{C}	9335.37±701.81^{B}	2.32±0.18^{BC}	2.02±0.16	1.92±0.32
3	20983.97±719.89^{C}	14416.67±912.42^{BC}	9259.62±812.32^{B}	2.40±0.22^{C}	2.07±0.19	2.03±0.29

Table 4 showed that the 150-day buttocks hair density of control group is extremely lower than 130-day hair density of group 2, 3(P<0.01), while has no significant difference with 130-day of group 1(P>0.05). The 150-day shoulder hair density of control group is significantly lower than 130-day group 3 (P<0.05), and has no significant difference with 130-day group 1, 2. The 150-day belly hair density of control group is extremely significantly higher than 130-day group 1, 2 (P<0.01), but has no significant difference with 130-day group 3 (P>0.05). The 150-day hair length of buttocks of control group is significantly lower than 130-day groups 1 and 3 (P<0.05), the shoulder hair length of all groups has no significant difference (p>0.05); the 150-day belly hair length of control group is extremely significantly higher than 130-day groups 2 and 3 (P<0.01).

Table 4: Fur quality comparison of 130,150 day rabbits (living body)

Group	Day	Hair density（root/cm^2）			Hair Length（cm）		
	（d）	Buttocks	Shoulder	Belly	Buttocks	Shoulder	Belly
Control	150	19666.7±750.1A	13093.4±1132.4a	8251.3±581.4A	2.22±0.17a	2.02±0.13	2.00±0.16A
1	130	19776.3±1052.3AB	12934.21±1673.7a	7648.0±949.2B	2.32±0.15b	2.10±0.17	2.03±0.24A
2	130	20155.5±835.2BC	12832.32±753.4a	7628.1±671.7B	2.29±0.19ab	2.01±0.16	1.83±0.17B
3	130	20480.8±996.5C	13653.85±931.7b	8272.4±749.4A	2.31±0.14b	2.07±0.16	1.89±0.24B

Table 5 shows that salted pelt area of control group has no significant difference with all the other groups (P>0.05). The buttocks pelt thickness of control group is extremely thicker than groups 2 and 3 (P<0.01). The shoulder pelt thickness of control group is significantly thicker than group 3 (P<0.05). The belly pelt thickness of control group is extremely thicker than groups 2 and 3 (P<0.01).

Table 5: Salted pelt performance after slaughter

Group	Pelt area (cm^2)	Pelt thickness (mm)		
		Buttocks	Shoulder	Belly
Control	1026.25±86.40	0.92±0.10A	0.87±0.09ab	0.92±0.08A
1	1139.38±142.22	0.88±0.13AB	0.89±0.08a	0.94±0.08A
2	1029.75±93.51	0.74±0.09C	0.79±0.06b	0.84±0.04B
3	1015.75±72.22	0.79±0.07BC	0.77±0.08c	0.79±0.04B

Currently, the research of melatonin in livestock and poultry is mainly focus on: animal reproductive performance, fur maturity and so on. Some researches indicated that implanting melatonin subcutaneously had no significant influence on growth performance of Rex rabbit, but could significantly improve fur density of Rex rabbit (Fu *et al.*, Qin *et.al.*, 2006), which is in consistence with our study.

Some study showed implanting melatonin subcutaneously could extremely significantly improve the growth speed of weaned rabbits, and accelerated follicle differentiation and improved hair density, made skin thicker and more mature (Gu *et al.*, 2007).

Although feeding melatonin had no significant influence on growth performance of experimental rabbits, but melatonin had the effect of promoting growth. Shen *et al*. (2009) found that melatonin had no effect on the length of coarse hair and fine hair in pearl wool rabbit, melatonin could increase the wool density in summer. This study indicated the function that implanting melatonin towards wool growth. Allain *et al*. (1988) showed that melatonin improved summer wool production and number of follicles obviously, but had no effect on hair length. Li *et al*. (2011) concluded melatonin apparently improved pelt area and wool density. However, feeding melatonin in this study did not influence pelt area.

CONCLUSIONS

In conclusion, adding melatonin can improve the performance of Rex rabbit, and improve significantly the wool density. In this study, when adding melatonin to a certain dose, the thickness of salted pelt decreased, and the effect on wool density become slight. Therefore, further experiments should be conducted to confirm the best dose and time.

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