

THE EFFECT OF ADDITIVE NAMED “JIAN TU SAN” IN FEED UPON THE PRODUCTIVITY OF REX RABBIT

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ABSTRACT

The *Rex* rabbit was used to study the effect of “Jian Tu San” additive at three levels (10g/kg, 20g/kg, 30g/kg) on feed upon the weight-gain, meat quality and the fur quality. The results show that the rate of weight-gain of three test groups was 15.47% ($P < 0.05$), 25.88% ($P < 0.01$) and 24.12% ($P < 0.01$) higher respectively than that of the control group. The conversion index of the groups was 13.41%, 22.03% and 20.15% lower respectively than that of the control group. The group 3, 4 presented a remarkably higher coarse protein digestion rate. The test group 3 has a very remarkably higher fat digestion rate ($P < 0.01$). The test group 4 only has a remarkably higher fat digestion rate ($P < 0.05$). Variable quantities of the additive have no remarkable effect upon dressing percent, the meat quality and fur quality. Though the meat ripening rate, leather area, hair density have a trend of increasing respectively, the difference was not remarkable ($P > 0.05$). In conclusion, the results of the present work shows that the inclusion of “Jian Tu San” additive could improve the performance (digestibility and growth) of *Rex* growing rabbits without any effect on meat and fur quality.

Key words: *Rex* rabbit, “Jian Tu San”, performance.

INTRODUCTION

With the development of the animal husbandry these years, the additive was being applied extensively. The additive contributes a lot to the animal productivity and feed efficiency, yet most additive contain the elements of chemical drugs, antibiotic and hormone, long time using of these materials in animal will bring about the problems of drug residue and drug resistance, which have the possibility of resulting in cancer, mutation to animal, and in turn do a harm to the health of human. Chinese traditional medical additive are more and more being taken seriously for their characters of safety,

low side effect, no drug residue, no drug resistance and cheapness, so a lot of countries are investing to study them.

Just in 60 years, the Soviet Union had proved the good effect of *Acanthopanax* Root as additive, and afterwards related articles emerged in France and Japan. Khanov, M.T. reported that the abstract of *Asiabell* root has the character of promoting the growth rate of *Rex* rabbit.

Many current reports proved that Chinese traditional medical additive have a remarkable effect upon the growth, reproduction, milk, disease resistance, fur, antler to pig, hen, cow, goat, duck, fish, deer, pigeon, fox, mink, rabbit for meat and rabbit for fur. Yet the study on *Rex* rabbit has never been reported, our experiment was to know of the effect of “*Jian Tu San*” additive upon the performance and fur quality of *Rex* rabbit and in turn establish a scientific base for the further research and exploiting of Chinese traditional medical additive.

MATERIAL AND METHODS

Animals

Selected 40 *Rex* rabbits of 45 days; equally divided them into 4 groups at random. The weight difference among the groups is not remarkable.

Diets

Components of basal diet (%): corn (23), bran (25), bean (18), hays powder (32), stone powder (1.5), salt (0.5). Calculated chemical composition (%): DE (9.95MJ/kg), CP (17.52), CF (17.86), EE (1.70), Ca (0.69), P (0.40), Lys (0.90), Met+Cys (0.53).

The additive was named “*Jian Tu San*”. It is made of *Astragalus*, *Atractylodes*, *Flavescent Sophora* Root, *Schisandra* Fruit, *Liquorice* and *MaiFanShi* etc., which were bought from Anguo city, Hebei. Grinder the drugs after cleaning and drying them, and then mix the powder with given proportion for the test.

The diets for groups 2, 3 and 4 contain “*Jian Tu San*” 10g/kg, 20g/kg, 30g/kg respectively and the group 1 is the control group with zero additive.

Experimental procedure

Length of the experiments: feed experiment (40 days), digestibility experiment (19 days), slaughter experiment (7 days), which constitutes the whole (total 66 days).

In feed experiment, all groups (every 3-4 *Rex* rabbits in one cage) were breed four times a day with unlimited quantity of water and feed without additive, and the feed with

additive gradually substitute for the initial feed within 5 days. The average weight of the each group's *Rex* rabbit on empty stomach at the beginning of the experiment was the initial weight, and that at the end of the experiment was the final weight. The feed-consuming quantities was daily recorded.

Digestibility experiment was carried on 3 selected *Rex* rabbits of 85 days, who have nearly the same weigh from every group. The experiment rabbits were kept in cages and in each cage one rabbit was kept. The quantities of the coarse protein in feed and feces was determined according to Kjeldahl's semimicro mensuration of nitrogen. The quantities of the coarse fat was determined by ether abstract method. The dry matter quantities was determined by $105 \pm 5^\circ\text{C}$ drying method. The ash that can't be dissolved in 4N-HCL was heated up to 650°C after being deal with 4N-HCL. The digestion rate formula is as follows:

$$\text{digestion rate (\%)} = 100 - 100(b*c)/(a*d)$$

- a: certain nutrition factor (such as protein or fat) percent in feed
- b: certain nutrition factor (such as protein or fat) percent in feces
- c: the ash percent in feed that can't be dissolved in 4N-HCL
- d: the ash percent in feces that can't be dissolved in 4N-HCL

The qualities of the meat and the fur were determined according to the method of ZANG SUMIN (1996) and XING HUA (1994):

- + pH was measured in the longissimus muscle of back on the end of the lumbar.
- + Water-losing rate (%) = $\{(\text{slices weight before being pressed} - \text{weight after being pressed}) / \text{weight before being pressed}\} * 100$.
- + Meat ripening rate (%) = $(\text{meat weight after being cooked} / \text{meat weight before being cooked}) * 100$
- + The qualities of coarse protein and coarse ash: the determined sample is quadriceps muscle of thigh: A qualities of coarse protein (Kjeldahl's semimicro mensuration of nitrogen). B qualities of coarse ash (burning method with $550-600^\circ\text{C}$).
- + Leather area = length between middle point of the neck * the width of the waist
- + Leather thickness = determining the thickness of shoulder, back and buttocks by vernier calipers.
- + Hair density ($\text{amount}/\text{cm}^2$) = $(\text{accurate weight of hair on } 1\text{cm}^2 \text{ leather} / \text{one thousand hair weight}) * 1000$.
- + Hair length: determining the length of the hair on shoulder, back and buttocks by rulers.

Data were analysed in all the experiment using an ANOVA procedure with Excel 97 software.

RESULTS AND DISCUSSION

Effect on performance

Table 1 shows that the rate of daily weight gain of three test groups is 15.47% ($P<0.05$), 25.88% ($P<0.01$) and 24.12% ($P<0.01$) higher respectively than that of the control group. The CI values of the test groups was 13.41%, 22.03% and 20.15% lower respectively than that of the control group.

Table 1. The effect upon weight-gaining and feed-consuming.

Group	Initial weight (g)	Final weight (g)	Daily weight gain (g/day)	Daily feed intake (g /day)	CI
1	853.5±111.3	1408.0±169.5	15.84±2.09 ^a	99.18	6.26
2	890.0±110.9	1530.0±163.6	18.29±2.23 ^b	101.03	5.52
3	843.0±96.9	1541.0±102.0	19.94±1.90 ^b	102.28	5.13
4	870.5±93.1	1558.6±153.0	19.66±2.08 ^b	102.49	5.21

Means in a column with a different letter were different significantly ($P<0.05$)

CI: Conversion Index

Effect on digestibility rate

Table 2 indicates that the digestion rate of the dry matter in the test groups is higher than that in the control group, though the difference is not remarkable. As to the digestion rate of the coarse protein and fat, the value in the test groups is remarkably higher than that in the control group. It is importance to notice the very remarkably higher digestion rate of the coarse fat in test group 3. All these prove that “Jian Tu San” has an excellent function to promote the digestion rate of the protein and fat, which are consistent with the notable weight-gaining per day of the *Rex* rabbit.

Table 2. Digestibility rates.

Group	Dry matter (%)	Crude protein (%)	Crude fat (%)
1	55.51±2.68	71.23±0.62 ^a	70.18±1.83 ^a
2	55.60±1.34	71.35±2.08 ^a	72.19±3.82 ^{ab}
3	56.71±1.25	72.16±0.63 ^b	75.03±0.75 ^b
4	56.00±0.74	72.72±0.82 ^b	73.77±2.20 ^b

Effect on slaughter rate

Table 3 shows that the difference of the dressing percent, no matter with head or not, between the test groups and the control group is not remarkable.

Table 3. The effect upon the dressing percent.

Group	Weight before slaughter (g)	Dressing percent with head (%)	Dressing percent without head (%)
1	1698.33 ± 70.06	55.58 ± 0.67	49.47 ± 0.44
2	1720.67 ± 49.08	54.56 ± 1.08	49.54 ± 1.58
3	1749.67 ± 53.89	55.75 ± 1.90	50.35 ± 2.31
4	1701.00 ± 78.58	55.19 ± 0.49	49.26 ± 1.54

Effect on meat quality

Table 4 shows that the difference of the meat quality between the groups is not remarkable, though the meat ripening rate has a trend of increasing.

Table 4. The effect upon the meat quality.

Group	pH	Water-losing rate(%)	Meat ripening rate (%)	Coarse protein (%)	Coarse ash (%)
1	6.41 ± 0.23	20.65 ± 2.79	58.69 ± 3.48	24.30 ± 0.39	1.26 ± 0.02
2	6.40 ± 0.09	18.59 ± 1.59	58.78 ± 3.51	24.47 ± 0.94	1.22 ± 0.03
3	6.35 ± 0.16	20.25 ± 1.00	61.94 ± 2.12	24.80 ± 0.80	1.22 ± 0.04
4	6.57 ± 0.12	22.25 ± 2.03	62.16 ± 2.21	24.61 ± 0.14	1.21 ± 0.03

Effect on fur

Table 5, 6 show that there are no remarkable difference about the leather thickness and hair length in three body parts.

Table 5. Effect on the leather.

Group	Leather weight/body weight (%)	Leather area (cm ²)	Leather thickness (mm)		
			Shoulder	Back	Buttocks
1	10.31 ± 1.17	980.93 ± 77.83	0.63 ± 0.07	0.72 ± 0.05	0.76 ± 0.10
2	12.26 ± 0.81	1074.78 ± 21.29	0.62 ± 0.06	0.71 ± 0.10	0.79 ± 0.09
3	10.96 ± 0.42	1054.44 ± 36.94	0.74 ± 0.08	0.76 ± 0.08	0.83 ± 0.12
4	10.78 ± 1.26	1016.10 ± 40.55	0.62 ± 0.02	0.66 ± 0.10	0.73 ± 0.08

Leather thickness and hair density have a trend of increasing, yet the trend is not remarkable ($p > 0.05$). No matter in the test group or in the control group, the longest hair part is buttocks and the shortest hair part is shoulder.

In conclusion, the results of the present work shows that the inclusion of “Jian Tu San” additive could improve the performance (digestibility and growth) of Rex growing rabbits without any effect on meat and fur quality.

Table 6 .Effect on the hair

Group	Hair length (cm)			Hair density (amount/cm ²)
	Shoulder	Back	Buttocks	
1	1.64±0.07	1.68±0.06	1.77±0.07	14227±3035
2	1.68±0.08	1.71±0.08	1.83±0.11	14356±2269
3	1.64±0.05	1.75±0.11	1.82±0.06	16887±2803
4	1.61±0.11	1.64±0.07	1.78±0.07	15331±1411

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