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THE ASSESSMENT OF THE INFLUENCE OF CYSTEINE DOSAGE IN FEED ON REX RABBIT SKIN'S QUALITY

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ABSTRACT

This research focused on the influence of cystine dosage in feed and rex's age on the quality of rex rabbit skins during growth process. To assess the quality of rex skins, the tensile strength, tear strength, thickness of hairs, whiteness, fiber strength and gloss were tested. The results showed that different cystine dosage and different ages had influence on the quality of rex rabbit skins

Key words: Rex skins, cystine dosage, quality of rex skins, assessment

INTRODUCTION

The quality of rex skins not only depends on the species, but also relate to supplementation some additives in feed such as amino acids or trace elements. Rabbit hair fibers are made of keratin, in which cystine is one of the most amino acids. So supplementation cystine in feed will promote the growth and development of secondary follicle, and improve the density of the rex fur. Because amino acids are the main component of proteins, we observe the quality of rex skins with different cystine dosage in feed and animal ages. In this work, to evaluate the quality of pelt at about 130 days and 160 days, the important parameters such as thickness, whiteness, gloss and fiber strength and the difference between fresh skin and tanned skin were analyzed. Briefly, the experiment was divided into two parts (130 or 160 days) and every part then fall into six groups according to the content of cystine supplementation in order to compare pelt quality in the six groups according cystine content in the feed and the animal age.

MATERIAL and METHODS

The rex rabbit were raised at the Institute of Rex Rabbit of Sichuan Academy of Grassland Science. The rabbit were divided into six groups which were fed with the following cystine content: 0.01%, 0.02%, 0.04%, 0.06%, 0.08% respectively (Zeng *et al.*, 2014), and one control group. Each group was divided in two parts according animal age: 130 and 160 days respectively. Finally, 20 rabbits of each group were slaughtered to obtain the pelt for quality analysis (Wu, 2004).

In this experiment, the thickness of fresh rex hair was measured by Heavy type thickness gauge on 3 different parts of the fur: the neck, the back and the buttock. Because of the difference in rabbit fur, three parts of the rabbit fur (the neck, the belly and the buttock) were examined. To obtain the thickness of rex fur, SPSS software was used for processing. The whiteness of fresh rex hair and tanned rex hair were analyzed using Color-eye 7000A spectrophotometer by measuring whiteness on 3 different points of the fur (Jiang and Wang, 2013).

Three points as above on each pelt were chosen to measure. Then SPSS software was used to process data and after that the whiteness results analyzed. Multi angle gloss meter was used for measuring the gloss of the rabbit. Three points as above on each pelt was selected, and the measure angle was 20 °. Then SPSS software was used to process data and after that the gloss results analyzed. YG001A Single Fiber Electronic Strength Tester was used for measuring the strength of the rex rabbit fibers

(Zheng and Yi, 1989). The strength was tested on Single Fiber Electronic Tensile Strength Tester according to GB/T 3916-199 (Zheng and Li, 2014). Mechanical strength includes two aspects which is the tensile strength and tear strength. The mechanical strength fresh rex skins and tanned rex skins were recorded using Tensile testing machine.

RESULTS AND DISCUSSION

Thickness of rex fur

Fur thickness on the neck showed no significant ($p = 0.151$) difference while significant differences due to age the belly ($p = 0.048$) and buttock ($p = 0.021$) were significant due to age by means of the SPSS analysis. In table 1, it can be seen that the highest thickness was observed on the buttocks whatever the age, moreover, the buttock thickness of 160 days was better than the buttock thickness of 130 days; 160 days rex's belly thickness and buttock thickness was slightly better than 130 days rex's. Overall, the fifth group of 130 days, thickness was the best one. In summary, the thickness of the rex rabbit is related to the amino acid dosage and ages, which shows positive influence on the thickness. But there was a limit to this effect, when the cystine dosage achieved 0.06%.

Table 3: fiber strength (mean \pm standard error) data

Table 1: Fur thickness (mean \pm standard error) data

group	Neck thickness (mm)	belly thickness (mm)	Buttock thickness (mm)	
130 days	1	0.46 \pm 0.22 ^c	0.36 \pm 0.20 ^c	0.93 \pm 0.27 ^{ab}
	2	0.58 \pm 0.25 ^{bc}	0.38 \pm 0.15 ^c	0.88 \pm 0.23 ^{ab}
	3	0.66 \pm 0.28 ^b	0.45 \pm 0.22 ^c	0.57 \pm 0.23 ^{bc}
	4	0.58 \pm 0.25 ^{bc}	0.42 \pm 0.21 ^c	0.71 \pm 0.27 ^b
	5	1.08 \pm 0.20 ^a	1.37 \pm 0.23 ^a	0.81 \pm 0.19 ^a
	6	0.51 \pm 0.24 ^{bc}	0.38 \pm 0.08 ^c	1.13 \pm 0.24 ^a
160 days	1	0.49 \pm 0.16 ^c	0.60 \pm 0.38 ^b	0.94 \pm 0.42 ^{ab}
	2	0.45 \pm 0.33 ^c	0.47 \pm 0.26 ^c	1.18 \pm 0.34 ^a
	3	0.38 \pm 0.16 ^c	0.51 \pm 0.37 ^{bc}	0.84 \pm 0.32 ^{ab}
	4	0.46 \pm 0.29 ^c	0.58 \pm 0.17 ^{bc}	1.05 \pm 0.27 ^a
	5	0.36 \pm 0.22 ^c	0.66 \pm 0.27 ^b	1.12 \pm 0.36 ^a
	6	0.58 \pm 0.34 ^{bc}	0.69 \pm 0.24 ^b	1.19 \pm 0.43 ^a

Values having different letters as exponent are significantly different ($p < 0.05$)

Whiteness of rex fur and Gloss of rex

The results of two parts were significant by means of the SPSS analysis. It can be seen from table 2 that the whiteness of tanned leather is better than fresh skins no matter what ages. In general, cystine dosage and age has little influence on whiteness of rex.

It can be observed in table 2 that the gloss of tanned leather is lower than in fresh skins whatever the animal age, the older rex, the better gloss.

Table 2: gloss data and whiteness (mean \pm standard error) data

		gloss		whiteness	
		Fresh skins	Tanned leather	Fresh skins	Tanned leather
130 days	1	93.50 \pm 0.66	94.04 \pm 0.52	93.50 \pm 0.66	94.04 \pm 0.52
	2	93.82 \pm 0.72	93.69 \pm 0.69	93.82 \pm 0.72	93.69 \pm 0.69
	3	93.96 \pm 0.62	94.04 \pm 0.66	93.96 \pm 0.62	94.04 \pm 0.66
	4	94.11 \pm 0.59	94.03 \pm 0.73	94.11 \pm 0.59	94.03 \pm 0.73
	5	93.98 \pm 0.59	94.23 \pm 0.42	93.98 \pm 0.59	94.23 \pm 0.42
	6	94.16 \pm 0.79	93.92 \pm 0.77	94.16 \pm 0.79	93.92 \pm 0.77
160 days	1	92.05 \pm 0.97	93.08 \pm 1.71	92.05 \pm 0.97	93.08 \pm 1.71
	2	92.29 \pm 1.20	94.02 \pm 0.67	92.29 \pm 1.20	94.02 \pm 0.67
	3	92.83 \pm 0.94	93.65 \pm 1.25	92.83 \pm 0.94	93.65 \pm 1.25
	4	92.40 \pm 0.77	93.62 \pm 0.70	92.40 \pm 0.77	93.62 \pm 0.70
	5	93.11 \pm 0.64	92.75 \pm 1.19	93.11 \pm 0.64	92.75 \pm 1.19
	6	92.37 \pm 0.88	93.27 \pm 1.41	92.37 \pm 0.88	93.27 \pm 1.41

The strength of fibers

Data on table 3 indicates that, fiber strength increased with age. On the whole, the fiber become stronger with increasing cystine contents. In addition, the sixth group of 160 days has the best fiber strength.

Table 3 : Fibre strength (mean ± standard error)

		fiber strength (CN)	Elongation (%)
130 days	1	2.68±0.41	2.03±0.39
	2	2.47±0.31	2.08±0.44
	3	2.62±0.49	2.24±0.34
	4	2.47±0.29	2.14±0.35
	5	2.47±0.32	2.22±0.41
	6	2.59±0.41	2.23±0.36
160 days	1	2.96±0.88	2.28±0.41
	2	2.92±0.93	2.13±0.42
	3	2.49±0.65	2.15±0.47
	4	2.82±0.77	2.15±0.59
	5	2.79±0.74	2.01±0.59
	6	3.20±1.21	2.06±0.48

Mechanical strength

Tensile strength in the horizontal pelt (p = 0.045) showed significant differences with ages. But the result of tensile strength in the longitudinal pelt which is the same to tear strength was not significant. There is a law in

the following data, which is mechanical strength of tanned leather is much better than mechanical strength of fresh skins whatever the strength is. And older rex skins had larger strength. The best mechanical strength of Rex fur was observed in 160-days tanned leathers (see table 4).

Table 4: Mechanical strength (mean ±standard error) data

group		Tensile strength (horizontal) MPa	Tensile strength (longitudinal) MPa	Tear strength N/mm	
130 days	Fresh skins	1	4.12±1.79	4.14±3.13	24.92±2.32
		2	9.61±2.28	9.72±4.15	26.68±2.39
		3	5.60±1.92	6.71±3.12	22.72±3.03
		4	4.60±2.97	9.00±2.69	22.35±2.38
		5	7.91±4.11	9.83±4.94	23.20±3.33
		6	7.45±2.16	8.25±3.12	30.89±4.03
	Tanned leather	1	14.19±2.86	15.52±2.72	25.68±2.46
		2	14.08±2.95	15.41±3.40	31.25±3.12
		3	12.77±3.46	13.23±2.32	27.06±1.96
		4	12.15±1.88	14.28±2.57	26.34±2.46
		5	14.65±3.39	16.29±2.57	30.74±3.52
		6	11.22±3.06	13.64±3.31	31.02±3.22
160 days	Fresh skins	1	7.39±4.25	7.29±3.74	15.10±6.47
		2	9.81±3.77	9.95±3.89	16.43±7.48
		3	9.92±4.84	9.31±3.93	21.01±6.67
		4	6.28±3.23	6.98±3.38	17.08±8.47
		5	9.47±4.32	8.10±4.05	18.42±8.86
		6	9.87±3.12	8.97±4.76	18.88±4.78
	Tanned leather	1	15.85±1.47	18.86±2.97	34.89±1.19
		2	16.35±2.83	19.68±2.37	35.29±2.73
		3	18.65±1.44	20.05±2.90	35.71±1.04
		4	19.37±1.57	19.80±1.86	35.55±1.14
		5	20.06±2.16	20.52±1.19	36.40±0.46
		6	19.59±3.52	19.36±2.14	34.27±2.25

CONCLUSION

Based on the above evaluation of Rex fur qualities: thickness, whiteness, gloss, fiber strength and mechanical strength of skin, it can be conclude that: 1) at the same age of Rex rabbit, thickness, whiteness, gloss, fiber strength and mechanical strength had a little relationship with the cystine content, with a positive correlated effect on the thickness, fiber strength and mechanical strength without any effect on gloss and whiteness, 2) at the same cystine content, it was seen that 160 days Rex fur hairs are quality is slightly better than the 130 days quality of Rex hairs. Third, when the age and cystine dosage are the same, compared rex fresh skins, hair's whiteness and mechanical strength of the tanned leather are higher. However, gloss of tanned rex hairs is lower than fresh skins

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