STUDY ON FUR DENSITY IN REX RABBIT

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ABSTRACT

Thirty American Rex rabbits (1 to 6 months-old) were selected in winter (December to February) and summer (June to August) respectively and the wool thickness (1cm² width) were measured at scapula, middle of back, middle of one side of body, buttocks and middle of belly respectively by five point sample-taking method. The thickness was measured again at the same points after the rabbits were slaughtered and the density was counted. The observations indicated. The fur density was different at different age, season and body position and increased with age before 5-months old and especially before 3-months old. The fur density reached a maximum at 5-months old and decreased slightly at 6-months old. This indicated that the hair follicle differentiation of rabbit was over at 5-months old. The fur density was different according to season and the winter's was thicker than the summer's but the difference was not significant ($p>0.05$). The fur density was significantly different according to body position. The middle of the belly was the thinnest while the buttocks' was the thickest. It was typical at the middle of one side of body or the middle of back. Under the same feeding and management, the fur density was significantly different among the individual. The top average density was 19000/cm^2 and at back it reached 30000/cm^2. It is caused by heredity difference. In the study, the fur coefficient was calculated according to the correlation between fur density and thickness. This made fur density-measuring quantitative, simple and practical. It is important for Rex rabbit breeding and fur grading.

Key words: rex rabbit, fur density, sample-taking method, coefficient.

INTRODUCTION

Rex rabbit is a kind of fur-product animals, and the fur was in favor by the people with its unique style. How is Rex rabbit fur density and how to measure it? Where is the representative body location and how about it changes with age and season. There is no unified method at present. To solve these problems, the authors undertake experiment for three years.

MATERIAL AND METHOD

Animals and management

30 White American Rex rabbit (1 to 6 months years old respectively) were chose in winter (December to February) and summer (June to August) respectively. The rabbits were fed using same conditions and diet nutrition level was defined according to rabbit nutrition requirement standard.

Method and data analysis

Fur samples were taken before slaughtering at 5 different body positions (middle of back, middle of one side of body, buttocks, middle of belly and scapula). Within each body position, fur samples were taken through five point sample-taking method (the sample was taken from five position per each body location) in order to have a good a representative evaluation of fur density per body region. A 1 cm^2 area sample was measured and small fur samples were taken at five different positions within each body location. The sample weight and the gross fur weight were determined respectively and the fur fiber number of sample was accurately counted under the microscope. So fur density was calculated according the following formula:

$$N = W_1 n / W_2 S$$

Where N is the fur fibre number per cm^2; n, the number of fur fibres sample ; W_1, the weight (mg) of the gross skin ; W_2 , the weight (mg) of the fur sample, and S the total skin area (cm^2).

Fur thickness was measured with a vernier calliper. The two parallel bars of the vernier calliper spaced of 1cm were introduced within the fur. All fur fibres included between the 2 bars were compressed and thickness was measured as the width of the compressed fur fibres.

Data were analyzed by using a one factor variance analysis and Duncan' method was used to compare means.

RESULTS

Change of fur density

Fur density of Rex rabbit was different according to age, season and body position. It increased with age. Early stage was the most vigorous particular period of fur development and was achieved to the maximum at 5-months old. At 6-months old it decreased slightly as compared to 5-months old.

Table 1. Statistics (mean ±SD) on fur density at different body position according to age and season (fur fibre number/cm ^{2}).

Position / Age	Winter						Summer					
	Back	Side	Belly	Buttock	Scapula	Average	Back	Side	Belly	Buttock	Scapula	Average
1- month	6057 ±312	6109 ±323	4456 ±254	6640 ±365	7326 ±418	6125	6325 ±342	5923 ±338	4243 ±216	9027 ±523	4959 ±265	6095
2-months	8968 ±511	9423 ±556	5736 ±304	12319 ±725	9416 ±537	9172	7094 ±405	6261 ±371	4107 ±239	10324 ±542	6201 ±361	6798
3- months	12228 ±703	10756 ±637	7176 ±408	15009 ±869	13934 ±835	11837	11447 ±675	12351 ±703	8239 ±485	13305 ±797	11126 ±658	11294
4- months	13627 ±819	12248 ±761	9273 ±555	16185 ±984	12098 ±728	12686	10155 ±619	10033 ±601	6775 ±433	12900 ±784	11272 ±699	10227
5- months	13219 ±807	13542 ±819	9158 ±561	17865 ±1125	12790 ±765	13315	12639 ±777	12783 ±796	7129 ±442	19009 ±1179	11317 ±682	12575
6- months	12863 ±815	12930 ±827	8513 ±544	17002 ±1071	12402 ±797	12706	11903 ±739	11723 ±726	8815 ±556	16592 ±1063	9824 ±631	11772

This indicated that in Rex rabbit hair follicle differentiation begins from embryo period and finished at 5-months old. After 5-months old as weight and the surface area increased, fur density reduced to some extent.

According to the different body positions, there was a large variation in fur density with a maximum at the buttocks and a minimum at the belly location. The back and the side were the most representative body location.

The fur density was different according to the season and was slightly higher in winter, but the difference is not significant ($p>0.05$). This result was agreement with RAHARJO (1992).

Under the same nutrition and management conditions, fur density of Rex rabbit varied significantly between individuals. The lowest average density is 19189, while the highest is 32871 at the same body position (buttocks).

Coefficient of fur density

According to fur thickness (cm) and the number of fur fibres per cm^2, the coefficient of fur density was calculated as following:

Coefficient of fur density= number of fur fibres per cm^2 / thickness (cm)

And the fur density (Table 2) at any position in the rabbit body was calculated as following:

Fur density =coefficient of fur density X thickness (cm)

Table 2. Fur density coefficient (mean ± SD) determined *in vivo* or on dried pelts of Rex rabbit according to age and season.

Season	Winter		Summer	
Age	Alive	Dried	Alive	Dried
1- month	11800±1947	10700±1678	10900±1832	9900±1643
2- months	12700±1956	11600±1783	11700±1356	10700± 1368
3- months	14100±1727	12800±2562	13200±1625	12000±1482
4- months	14100±1426	12800±1309	13400±1391	11200±1177
5- months	14200±1402	12900±1289	14400±1470	13100±1342
6- months	13300±1272	12100±1197	13000±1299	12500±1236

The correlation coefficient of fur density between in vivo and pelt dried measurements was 0.93.

DISCUSSION

Measurement method of fur density

Fur density of Rex rabbit is the most index of fur quality. But today there is no ideal method to measure fur density of Rex rabbit. Generally, people cut a piece of 1 cm^2 fur area at a rabbit body position and count directly the gross number of fibres. The method is too complex. Another method is according to fur index method (density was calculated by the thickness/cm^2 multiply by the fur density coefficient as in table 2). But it gives too different results. So how to determine the fur density is difficult for most study. This research showed that the five-point sample-taking method is a feasible way for most farmer or scientist to evaluate the fur density.

Sample-taking method

The sample-taking method is more and more used for fur density measurement. Someone take a 1cm^2 fur sample from the edge of the skin. The authors find a great error because Rex rabbit fur fibre number is large and the fur plexus structure is complex. A lot of fur fibres were cut or cuts off and the fur fibre number was not precise by using this method. So it must be better to cut a skin piece from the fur surface by using needles (the small size injector or others) to separate the fur plexus and a knife (or a scalpel). Then the fur area was accurately ascertained. At last, the number of fur fibres was counted and the density was calculated.

Representative body position of fur density

By the 5-point sample-taking method, the authors found that: the fur density varied according to different body position with a maximum at the buttocks location and a minimum at the belly location. The middle of back, middle of side had the highest correlation coefficient with the average density. Therefore, only one of them can be considered as the representative body position.

The change of density

The fur density was influenced by many factors, such as heredity, nutrition, age and season etc. This study showed that the fur density increased with age and it reached a maximum at 5-months old while it decreased slightly at 6-months old. The base of fur density is hair follicle differentiation. Any factor that influences hair follicle differentiation can influence fur density. The ending of hair follicle differentiation in Rex rabbit is approximately at 5 months of age, so the fur density is maximal at that time. To increase fur density, the measurement should be made before 5 months of age, especially before

3 months old. The fur density varies according to the season with a higher density in winter than in summer ($p>0.05$).

Fur density index

However by adopting any kind of sample-taking method, the fur will be destroyed. So the method had no practical value. In this study, we obtained results between fur density and thickness and listed the evolution of values according to age, season and body location. It can be used easily and fast with an accuracy reaching over 90%.

REFERENCES

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