

Analysis of coat quality of Chinchilla rabbit breed

Petra Neirurerová*, Martin Fik, Jaroslav Andreji, Eva Mamojková
Slovak University of Agriculture in Nitra, Slovak Republic

Article Details: Received: 2018-10-25 | Accepted: 2018-11-27 | Available online: 2019-01-31

<https://doi.org/10.15414/afz.2019.22.01.17-20>



Licensed under a Creative Commons Attribution 4.0 International License

Between breeders, Chinchilla rabbit is very popular as it has standard body shape and high quality of typically coloured fur. The aim of this study was to analyse quality of Chinchilla rabbit fur. Coat samples were gathered at the National Animal Exhibition in Nitra. We collected samples from three different body areas – those being scapula, back and thigh. Altogether, we obtained 153 samples of different individual animals. We observed different parameters of the fur. Those were – thickness and length of coat, height and width of the undercolour, ticking and height of the guard hair. We found out that average thickness of coat in the examined population was 0.106 mm in the area of scapula; 0.104 mm in the thigh area and 0.113 mm from the back area. Length of the guard hair from area of scapula was 35.8 mm; 37.9 mm in the thigh area and 36.4 mm in the back area. Height of the undercolour was 26.9 mm in the back area, 26.4 mm in area of scapula and 27.6 mm in the area of thighs. Observed width of intermediate colour was 5.1 mm in thigh area; 4.3 mm in back area and 4.8 mm in scapula area. Measured height of terminal black line of hair was 4.7 mm in area of scapula; 5.3 mm in the back area and 5.3 mm in thigh area. The differences among the evaluated body areas were not significant.

Keywords: fur, quality, hair, rabbit, Chinchilla

1 Introduction

Chinchilla is originally a breed that came from France. It was originally bred by N.J. Dybowski who was originally a Pole. It was exposed for the first time in Saint-Maur in 1913. In 1915 it got to England, later in years 1920 and 1923 to Switzerland, respectively to Czechoslovakia where it was initially exposed at exhibition in Pardubice by breeder named F. Majer. Commercial possibilities of using the Chinchilla rabbits is described by Brumwell (1928). Fashion trends have big effects on the demand for rabbit hairs and therefore this cause variation in world prices. Deedrick and Koch (2004) describe the basic structure of hair. Hair can be defined as a slender, thread-like outgrowth from a follicle in the skin of mammals. They have presented that animal hairs are classified into three basic types (guard hair, fur or wool hairs and tactile hairs or whiskers) and that animal hairs can be classified into three major groups on the basis of their microscopic appearance (deer family and antelope, commercial fur animals and domestic animals. Chinchilla produces very esthetical and quality fur. Glossy, well laid-down and flexible fur is the characteristic of healthy individual. The

flexibility of fur is based on thickness of individual guard hair to which we give extra attention. The aim of the study was to analyse the quality of coat and structure of fur of Chinchilla rabbit.

2 Material and methods

Material and samples were gathered over the course of five years at International exhibition in Nitra and we gathered fur samples of 153 rabbits of Chinchilla. Individual samples were collected from three different parts of body – scapula (1), back (2) and thigh (3). We used the samples to measure and weigh the thickness of guard hair, total length of guard hair, height of the undercolour, width of ticking and length of terminal black line of the guard hair which creates a typical black ticking for this breed. During review of the animals we evaluated flexibility of fur and ticking, as well as focused on main faults of this breed.

Width of guard hair was analysed by a method that uses stereomicroscope Olympus SZX 16 and software – QuickPhoto Micro (v.2.3, © Promicra, s.r.o. 2009). The methodology for measuring hair was developed on

***Corresponding Author:** Petra Neirurerová, Slovak University of Agriculture in Nitra, Faculty of Agrobiolgy and Food Resources, Department of Animal Husbandry, Trieda Andreja Hlinku 2, 949 76 Nitra, Slovakia, e-mail: p.neirurerova@gmail.com



Figure 1 Structure of Chinchilla rabbit fur

the basis described by Fik et al. (2011). We measured 10 guard hairs from each of observed areas and found out the average thickness of guard hair. As the place of measurement, we used the area in which the guard hair was the thickest, approximately in the middle of its length. Length of hair as well as its other parts – height of undercolour, width of ticking and length of terminal black line of hair we measured by sliding ruler. We again gathered 10 hairs from each area and we found out the average value. Likewise, we observed elasticity of the fur of this breed, which is one of main assessment factors at National Animal Exhibition. We picked a rating scale from one to four – where the value 4 was assigned to sample which got completely back to the previous state after teasing. Value of one was assigned to fur which kept standing after teasing. Occurrence of ticking was evaluated by three people – we spectated its sufficiency or insufficiency. The results were compared with *T*-test. The spreadsheet calculator MS Excel was used.

3 Results and discussion

During our experiment the average width of guard hair over the course of 5 years in thigh area was 0.104 ± 0.016 mm, in area of scapula it was 0.106 ± 0.015 mm and in back area it was 0.113 ± 0.019 mm. Kopański (1965) mentions width of guard hair 0.113 mm and thickness

undercoat 0.014 mm in Chinchilla rabbit. Average length of guard hair in area of scapula was 35.8 ± 5.254 mm, in the back area it was 36.4 ± 5.321 mm and in the thigh area 37.9 ± 3.947 mm. Chinchilla has typical rich dark blue colour undercoat and it is important that two thirds of hair should be as dark as possible. Undercolour height is an important trait for fur animal, which decides the wool hairs quality as the crucial index of evaluation (Huang et al., 2016). Average height of undercolour in the area of scapula was 26.4 ± 5.619 mm, in thigh area 27.6 ± 3.484 mm and in the back area we measured 26.9 ± 4.523 mm. Intermediate colour of is important part of guard hair that creates so called “play of colours” which should have width of 5 mm. Intermediate colour based on our measurements reached values similar to the standard. In our measurement – intermediate colour in thigh are was 5.1 ± 1.449 , in area of scapula it was 4.8 ± 1.363 mm and in the back are it was 4.3 ± 1.336 mm. Terminal black line of guard hair plays main role in creation of black ticking. Measured height of terminal black line of hair in area of scapula was 4.7 ± 2.296 mm, in back area it was 5.3 ± 1.996 mm and in the thigh area it was 5.3 ± 1.512 mm. During evaluation of fur elasticity that was rated on scale from 1 to 4 we rated the best fur as the one that got back to previous state after teasing. The highest quality fur was scored only in 26.4% of animals. A little bit lower tier rated

Table 1 Observed values of fur selected parameters

Parameters of the fur	Scapula area (mm)	Back area (mm)	Thigh area (mm)
Width of guard hair	0.106 ±0.015	0.113 ±0.019	0.104 ±0.016
Length of guard hair	35.8 ±5.254	36.4 ±5.321	37.9 ±3.947
Height of undercolour	26.4 ±5.619	26.9 ±4.523	27.6 ±3.484
Intermediate colour	4.8 ±1.363	4.3 ±1.336	5.1 ±1.449
Height of terminal black line	4.7 ±2.296	5.3 ±1.996	5.3 ±1.512

with number 3 was in 37.7% of animals. Even less flexible fur (marked 2) had 30.2% of animals. The least – inflexible coat where hair kept on standing vertically was observed in 5.7% of animals. Another typical sign of Chinchilla fur is black ticking formed by dark tip of the guard hair. Almost in all of the animals the ticking was marked sufficient – which means it was significant. Only 11, 3% of individuals had the ticking less visible and it was caused by brighter colouring of the body.

We saw many faults in our specimen of Chinchilla breed during the course of 5 years. Most frequent being brighter colouring of the body on the sides of corpus – which occurred in 24.5% of animals. Other noticed faults were deviations in colours of fur on the level of undercoat. The spectated brighter colour of undercoat in 5.7% out of total count of rabbits was detected. (In 9.4% of rabbits there was a very low transient colour as of which the colour gradation was hardly sufficient.). In 3.8% of animals (we seen misalignment in colours – caused by darker guard hair on the head. Some other rabbits had too soft structure of fur (3.8%). Fur is part of skin system, that way we also marginally focused on main fault connected with skin of the animals and that being loose skin in the neck and breast area which occurred in 20.8% specimen. Similar tendency of hair quality indicators in Chinchilla rabbits also describes Mamojková (2012) and Mamojková (2014).

Rabbit hair is a natural fibre, not contaminated in the processing. It is environmentally safe material with special morphological structure, it is a unique stylish garment and the demand for rabbit fur keeps on growing (Zhang, 2011). Mengüç et al. (2014) described physical properties of Angora Rabbit fibres. There are three types of hair that are known to be produced by the Angora rabbit – those being: guide hair, down hair and guard hair. Length of guard hair is usually around 80 mm and they are known to have rough points that lock together and lie over the down hair by which they seal off. Guide hairs usually grow up to 110 mm in length and have covering function for other hair and they guide the direction of their growth. Down hairs are smooth part of fur that tends to develop to length of 60 mm with small amount of cuticle scales. Down hairs are one of the finest animal materials used in

production of textiles because of their diameter which is only 14 µm. (Franck, 2001)

Length of guard hair has most importance in furriers, during the processing of furs. For this reason the highest straightness of fur is required that way no additional pruning is required because that way typical attributes of fur for the chosen breed can be lost. Average length of guard hair is 3 cm based on previous measurements by different authors. According to Dahiya and Yadav (2013) the structure of the animal hairs is different accordingly to which body region is the hair from. We are capable of distinguishing 3 regions in guard hairs. Firstly, the region closest to skin that being fine shaft or proximal portion closest to the skin. Secondly, a much wider distal section which is shield-shaped and flat in looks of it. And lastly, the one that tapers down to a very fine point. The considerable variety of guard hair rests in thickness and length but generally their length is longer than the rest of coat fibres and that way they basically shine through the undercoat. A single medulla composed of longitudinal series of cavities is usually contained in lower sections of guard hair as well as the tip of the guard hair and even the fur fibres. In the place where the guard hairs become thicker and obtain shield shaped shape in that place the medulla is created by multiple series of cavities – those being from two up to six. Only few of highest quality fur fibres (<8 µm) and the terminal ends of guard hair are solid protein – this type of medulla layout is a known rabbit characteristic (Rogers et al., 2006).

Verhoef-Verhallen (2000) characterizes Chinchilla as small and wildly coloured rabbit with completely vanished red and yellow pigment in fur. Colour of fur is grey with significant ticking, formed by black terminal lines of individual guard hair. Bottom part of body is always white, undercoat being dark blue. Important part of fur colouring is white intermediate colour which creates a ring typical for the breed. According to Covriget al. (2013) experts believe that the best chinchilla colours are produced with either an albino or Himalayan gene paired with the chinchilla gene. Even though the standard of the breed is strictly defined not every specimen fits it. Width of fur is equal for entire population even if sometimes guard hair is occasionally significantly thicker than they

should be, and that way thick guard hair can have effect on softness of fur. Length of fur is less uniform. While we examined this parameter, we noticed that there was higher variability in body where the longest fur occurred in the thigh area. Body colouring of Chinchillas is fairly uniform even though it is occasionally affected by darker rabbits brought from abroad. Best known fault of body colouring of Chinchillas is the different colouring when head or breast area is brighter than rest of the body. Uniformity has been reached in colouring of the undercoat – it was reached by selection where have been only individuals with dark undercolour. Another fault could be changes in intermediate colour which is often bright and that way usually less bounded and there could also be a problem with its width. Some specimen also had brownish colouring which can be currently changed very hardly. Fur in this individual is usually quite dense. Dense and flexible fur usually has shorter length and with shorter length comes less expressed veil – that way sometimes come to contact with individuals whose typical tenting completely disappeared. Comparing the results with other authors was not possible because we have not been able to find a work about evaluation of quality of coat and fur in Chinchilla breed. Given parameters are only stated in breeding standard.

4 Conclusions

The skin of rabbits is a visual parameter to their general state of health and the rabbit fibre has a good potential for producing textiles with special properties. Average length of guard hair in area of scapula was 35.8 ± 5.254 mm, in the back area it was 36.4 ± 5.321 mm and in the thigh area 37.9 ± 3.947 mm. Average height of undercolour in the area of scapula was 26.4 ± 5.619 mm, in thigh area 27.6 ± 3.484 mm and in the back area we measured 26.9 ± 4.523 mm. Intermediate colour in thigh area was 5.1 ± 1.449 , in area of scapula it was 4.8 ± 1.363 mm and in the back area it was 4.3 ± 1.336 mm. Height of terminal black line of hair in area of scapula was 4.7 ± 2.296 mm, in back area it was 5.3 ± 1.996 mm and in the thigh area it was 5.3 ± 1.512 mm. In the end we can only say that there are no significant differences – parameters are on same level from all our collected samples collected over five years. The biggest problem that should be taken care of in future is the existence of variability in colouring of individual animals, parts of their body or even guard hair. The results can be used for further breeding of the breed. Based on hair quality results, it would be possible to evaluate sires like those who contribute to improving the quality of hair and those who do not. Not ending and consistent selection of breeding work could sustain, possibly even improve quality of fur, feathering and that way it could keep the typical colouring that characterizes this breed. Interest in regular analysis of the results of the

hair quality of Chinchilla and breeds with a similar coat structure should have especially clubs of breeders.

Acknowledgments

This study is part of the project VEGA 1/0511/15 grant and VEGA 1/0625/15.

References

- BRUMWELL, W. (1928) *The Chinchilla Rabbit – Its Breeding For Profit*. Bradford: Wathmou.
- COVRIG, I. et al. (2013) The C locus: rabbit genetics for full color development, chinchilla, seal, sable, pointed black and red-eyed full white. *Rabbit Genetics*, vol. 3, no. 1.
- DAHIYA, M.S., YADAV, S.K. (2013) Scanning Electron Microscopic Characterization and Elemental Analysis of Hair: A Tool in Identification of Felidae Animals. *J Forensic Res*, vol. 4, no. 1, p. 178.
- DEEDRICK, D.W., KOCH, S. (2004) Microscopy of Hair Part II: A Practical Guide and Manual for Animal Hairs. *Forensic science communications*, vol. 6, no. 3.
- FIK, M. et al. (2011) Assessment of wire haired dachshund hair quality. *Acta fytotechnica et zootecnica*, vol. 14, pp. 81–84 (in Slovak).
- FRANCK, R.R. (2001) *Silk, Mohair, Cashmere and Other Luxury Fibres*. UK: Woodhead Publishing Limited in association with The Textile Institute, pp. 136–137.
- HUANG, D.W. et al. (2016) Location of genes associated with hair length of rabbit. In *Proceedings 11th World Rabbit Congress. Qingdao – China 15–18. 6. 2016*. WorldChina: Rabbit Science Association.
- KOPAŃSKI, R. (1965) *Elementary of furriers*. Warszawa: Państwowe wydawnictwo rolnicze i leśne (in Polish).
- MAMOJKOVÁ, E. (2012) *Evaluation of the breeding level of Little Chinchilla in Slovakia: bachelor thesis*. Nitra: SPU (in Slovak).
- MAMOJKOVÁ, E. (2014) *Evaluation of quality of hairs and coat in Little Chinchilla rabbit breed: Diploma thesis*. Nitra: SPU (in Slovak).
- MENGÜC, G. et al. (2014) Physical Properties of Angora Rabbit Fibers. *American Journal of Materials Engineering and Technology*, vol. 2, no. 2, pp. 11–13.
- ROGERS, A.D. et al. (2006). Fiber Production and Properties in Genetically Furred and Furless Rabbits. *Journal of Animal Science*, vol. 84, pp. 2566–2574.
- VERHOEF-VERHALLENOVÁ, E. (2000) *Encyclopedia of rabbits and rodents*. Čestlice: Rebo Productions (in Czech).
- ZHANG, Y. et al. (2011) Structure Structural Characteristics of Rabbit Hair. *Trans Tech Publications*, vol. 332–334, pp. 1073–1076.