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A NEW DIRECTION OF USING CHINCHILLA HAIR (CHINCHILLA LANIGERA) IN FARM ANIMAL HUSBANDRY

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Abstract

This work is devoted to a new direction in the fur industry - the use of natural wool collected from live chinchillas, products from which are pleasant and comfortable for humans. The advantages of this direction are also in the fact that after a service life, woolen things, unlike synthetics, without harmful consequences, organically dissolve in living nature. The novelty lies in not only opposing natural fur to synthetic, but also to propose a method of collecting wool from live chinchillas (using their physiological properties to "shoot off" tufts of wool), causing them only minimal discomfort. Conducted research shows that chinchilla hair is almost the finest compared to other types of fluff used by humans. The diameter of woolen hair, potentially capable of causing irritation and allergic reactions on human skin, ranges from 25 microns or more. The thinner the hair from which the woolen product is made, the closer to the human body it can be worn. This means that insulated underwear - pajamas, panties, for both adults and children - can be made from chinchilla fluff.

Keywords: Animal farming, Chinchilla, chinchilla hair, Chinchilla lanigera

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1. Introduction

Long-tailed chinchilla (Chinchilla lanigera) is a traditional object of cellular fur farming, whose skins are highly popular due to the unusual qualities of their fur. However, in recent years, in many countries, the killing of caged animals in order to obtain fur (skins) has become an increasing problem. In some western European countries, it is legally prohibited to breed chinchillas to obtain skins (Butakova et al., 2019). For the first time, we propose the in vivo production of wool from chinchillas, as is done in sheep and goat breeding, or, when receiving fluff from specially bred down geese.

This work is devoted to a new direction in the fur industry - the use of natural wool collected from live chinchillas, products from which are pleasant and comfortable for humans. The advantages of this direction are also in the fact that after a service life, woolen things, unlike synthetics, without harmful consequences, organically dissolve in living nature.

The novelty lies in not only opposing natural fur to synthetic, but also to propose a method of collecting wool from live chinchillas (using their physiological properties to "shoot off" tufts of wool), causing them only minimal discomfort. Thus, we hope to draw the attention of farmers to a new direction of chinchilla breeding.

2. Purpose of the Study

The purpose of work is to propose a new direction for the use of chinchilla wool as an anti-allergenic and environmentally friendly product. The work covers the following topics:
1) to analyze the state of fur cellular fur farming and its prospects,
2) investigate the structure of the hairline collected from chinchillas,
3) to substantiate the promising possibilities of using chinchilla hair (fluff) as a new ecological product,
4) to offer a new direction of additional products for chinchilla farmers.

3. Findings

The historical homeland of chinchillas is the Andes mountains, where the animals settled in the territory at an altitude of 1-3 kilometers above sea level. The area is characterized by relatively sparse shrub and herbaceous vegetation, strong winds, and temperatures ranging from 6 to 18 degrees. A study of the structure of the hairline collected from chinchillas showed that their fur is thin, light, fluffy, because it was formed in dry, cool air, where rain or snow is very rare. In this regard, in chinchillas there was no need to develop protection from moisture in the form of a hard and thicker top coat, as, for example, in a fox or a raccoon dog (Beketov et al., 2020; Ilyina, 1952). The chinchilla's guard hairs hardly differ from downy ones in thickness, in fact, they are straight with slight wavy bends (Figure 1 a).

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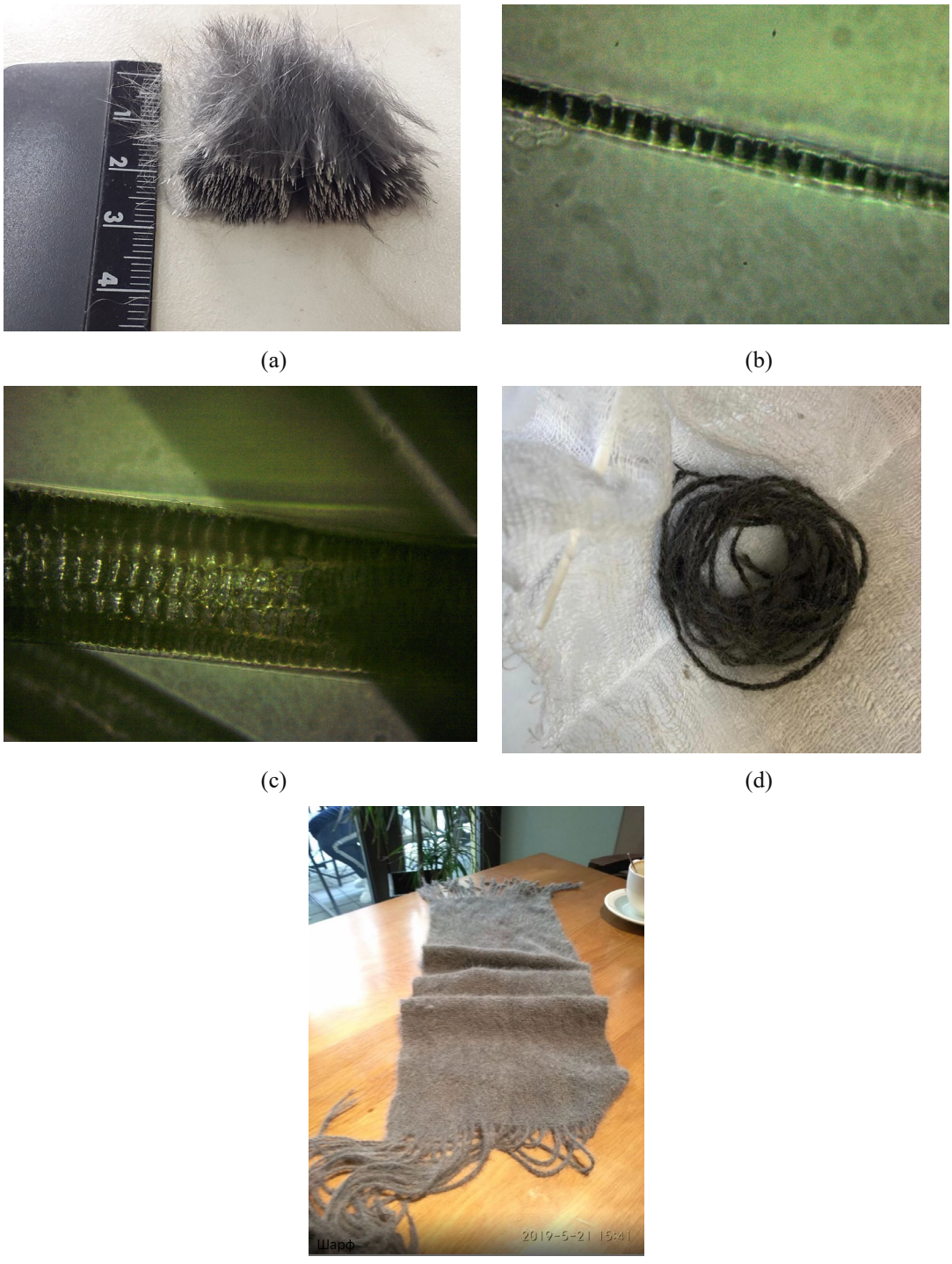

Figure 1. Chinchilla wool and hair characterstic. (a) Chinchilla hair is uniform, virtually the same in length and thickness; (b) Chinchilla hair structure, consisting of one row of scales; (c) Rabbit hair structure, consisting of several rows of scales; (d) Chinchilla down wool; (e) Chinchilla scarf woven from woolen thread

Chinchilla fur is a uniform, very thin, dense and warm structure for animals (Kozlov, 2019). Its uniqueness also lies in the fact that not 2-3 hairs grow from one bulb, but a bundle of 20-30 hairs. The same principle of bundle concentration of down is known among waterfowl - loons, ducks, goose, but their down is hidden under a cover feather that protects it from moisture.

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Laboratory studies of the hair structure carried out on the basis of the BiRKh Institute (MGUTU, Moscow) showed that the chinchilla has the thinnest hair in comparison with the hair of a down rabbit and goat down (as the thinnest of those currently used by humans). The thickness of a chinchilla hair, most often, is formed by only 1-2 rows of scales, while in a rabbit there are several of these rows (Figure 1 b, c).

Substantiation of promising possibilities of using hair (fluff) of chinchillas as a new ecological product is associated with the natural feature of chinchillas to “shoot off” bundles of wool. This property is developed by animals as a kind of maneuver to escape from a predator that has grabbed the animal. Due to its subtlety, lightness and quick fluffiness, the emerging wool creates the effect of a “cloud” of hairs, covering the nostrils and eyes of the predator. A similar defense technique is found in some beetles, which spray a poisonous liquid into the eyes of the attacking enemy, or in the lizard, which “shooting off” the tip of its tail, leaves it with the attacker for the sake of salvation. If such a trick helps the chinchilla to escape, then the hair on the exposed areas of the skin grows back in 3-4 months. At the same time, there is a specialization - the wool is ready to "jump out" at any moment from the back, sides and thighs - these are the traditional places of attack of a predator, in other parts of the body it clings to the skin more tightly.

This feature of chinchilla physiology - shooting off hair tufts - gives grounds to propose a new direction of farming chinchilla breeding - getting additional profit through the collection and sale of chinchilla fluff. This direction can become a key link in the study of a new type of business in chinchilla breeding - the lifetime uses of animal wool for the manufacture of expensive and fashionable products.

Investigating literary sources and information of the part of the Internet available to us, we did not find any serious description of the production based on the use of chinchilla down. Even among private handicraftsmen, only rabbit, alpaca, goat down is used. It should be noted that we found several recent descriptions of the use of mink hair in yarn on the Internet forums, but we do not know exactly how this hair was taken - from a live animal or from its skin, which was defective or of poor quality. Fortunately, we are well acquainted with the community of Russian farmers, among whom there is a person who has been fascinated by experiments on the use of chinchilla down for the third year (Golovacheva, 2019).

His name is Andrei Soloviev, his small farm of 500 heads is located in the city of Sergiev Posad, Moscow region. The animals are housed in a separate room, in polygamous cages on a mesh floor. All livestock are animals of gray standard color.

In 2018, Andrei became interested in the use of chinchilla fluff obtained as a result of molting, later he began to selectively use animals for forced collection of fluff. The result was a trial of chinchilla down products - a hat, a scarf and a vest. The hat is made using knitting of woolen thread, a scarf is woven of the same thread, and the vest is knitted of chinchilla fluff (like felt) in a one-cut fashion. According to our data, the successful results of Andrey Solovyov on the use of chinchilla fluff are the first and so far, the only ones in Russia (Figure 1 c, d, e).

Like all other fur-bearing animals, chinchillas shed - the hair finally matures by 10 months, then a regular change of wool begins (within 1.5-2 months) and then, this process occurs 1-2 times a year. Most often, it is confined to the autumn or spring period (Barantseva, 1972; Barantseva, 1983). Molting can sometimes be seen, usually on the animal's back along a "whitish veil" - hairs not completely emerged

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from dense fur (Kozlov, 2019). There are, however, specimens that clearly show that the chinchilla is molting (Figure 2a).

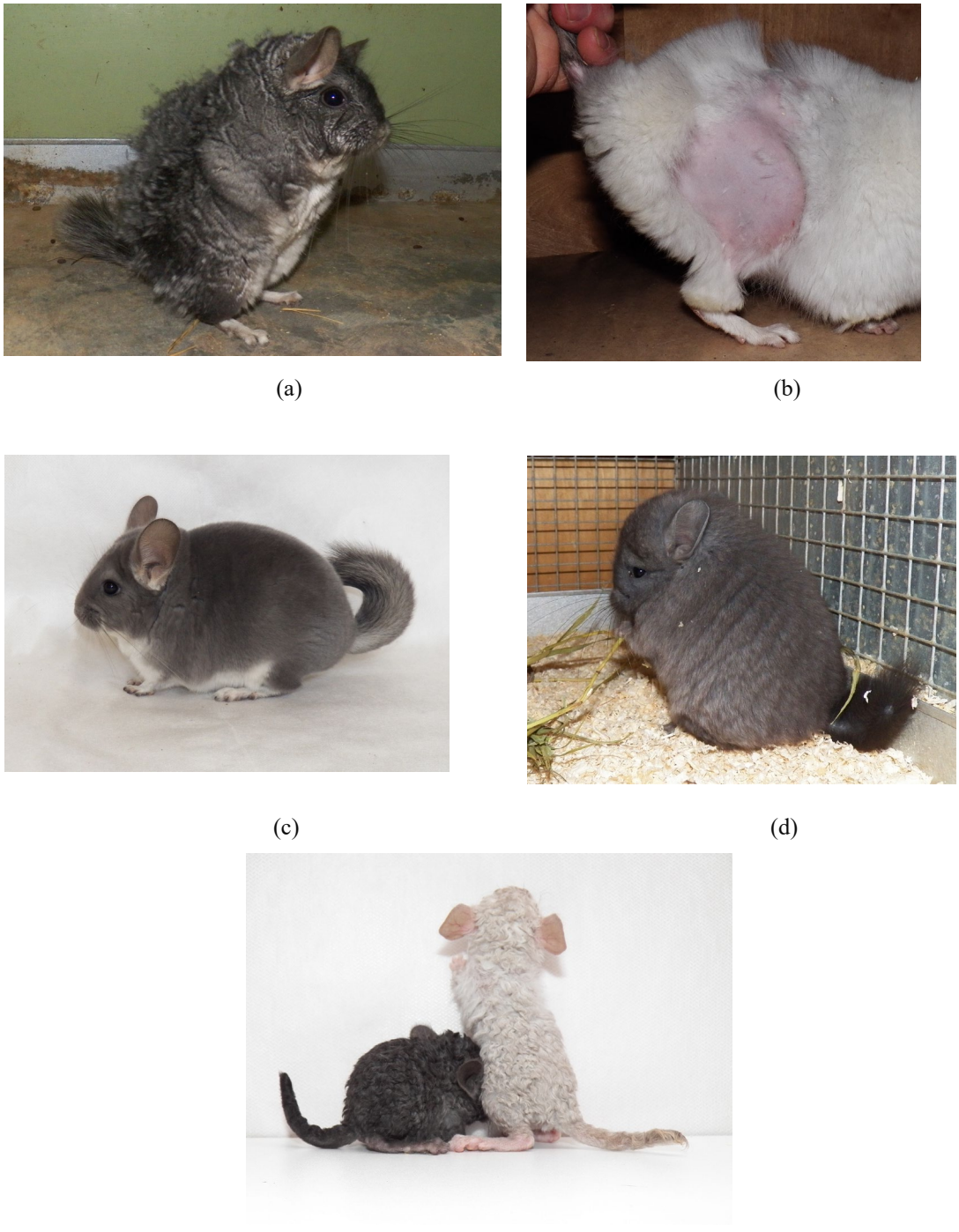

Figure 2. Some type of Chinchilla wool. (a) Shedding chinchilla; (b) Collect the fluff of the chinchilla using its "shoot" hair; (c) Chinchilla violet color; (d) Chinchilla with elongated fur - angora. Curly chinchillas, cubs

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Tufts of faded hair are retained for a long time in the general cover of animals with thick dense fur. It happens that in some of these chinchillas molting takes on a permanent character - that is, it is always (Kozlov, 2017, 2021).

We suggest collecting the hair taken from the chinchilla during molting for further use. During one molt, in several steps, 30-40 mg of fluff can be obtained from a chinchilla. This method is known for keeping dogs and some goat breeds.

At one time collecting fluff when "shooting" from one adult chinchilla, you can get 8-11g of fluff. Frequency of collection - every 4 months (Figure 2 b).

Thus, during the period of molting or "shooting" of fluff from one adult chinchillas, you can get 8-11 g of fluff at the same time. For a year, respectively, about 30 g of fluff. Simple calculations show that a farm of 10 thousand individuals can produce 300 kg of down per year (as additional products) (Table 1).

Table 1. Estimated amount of fluff collection from chinchillas

Down weight from 1 individual, g	Down collection frequency, once / year	Average weight of down from 1 individual per year, g	Total weight of down from 10 thousand individuals per year, kg
8-11 (10)	3	30	300

It is difficult for us to predict the price of chinchilla fluff or finished yarn. For example, a gram of fine yarn of downy goats (cashmere) costs 54 rubles, a thread in a ball of French-made Angora rabbit costs 52 rubles. Suppose that the sale of chinchilla fluff at market prices will be about 20 rubles / g, then you can get about 6 million rubles from a herd of 10 thousand adult chinchillas:

300,000 x 20 rubles = 6 million rubles.

Of course, a farmer will receive a much greater profit not from raw fluff, but from the sale of finished yarn or products - for example, knitted or knitted fashionable women's hats, vests, stoles, scarves.

Chinchillas, which from the very beginning will contain as downy, can start working earlier than "selfish" ones - not from 10 months, but from 6 months (Barantseva, 1972). At this age, they have a "shooting option" of fur - the separation of the bundles from the skin with a slight impact - pulling or pressing.

Having familiarized ourselves with the management of the farm on the farm of Andrei Solovyov, we offered him technological methods that improve the quality of products and their volume. One of them consists in choosing an early maturing color mutation - Afro-violet for breeding, the other - in the transition to the Angora chinchilla mutation, which is also distinguished by early maturity, but besides this, its hair is one and a half to two times longer than that of other chinchillas (Kozlov, 2020). Through crossing and selection, in 3-4 years it is possible to form a productive herd from the combined mutation of purple angora chinchillas, which will increase the productivity of the farm in terms of down by 1.5-2 times. Chinchillas of the combined mutation purple angora can be further crossed with other colors (mutations) and get the same more early maturing offspring.

Afro is a recessive mutation that was obtained in 1967 in Rhodesia (from where it got its prefix - afro). Chinchilla color can be lighter (bluish-gray tone, reminiscent of a blue mink) or darker, saturated

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(Kozlov, 2013). Some chinchilla breeders classify Afro-violet color into three tones - light, medium and dark.

An interesting feature of the fur of purple chinchillas - in daylight, a "pearl veil" is noticeable - the fur seems to be covered with a thin bloom of frost (Figure 2 c).

Angora - chinchillas with a gene for elongated hair. It sounds like royal persian angora, it was bred in the USA, but for some reason the name is often written "royal" and "persian". The mutation is very effective and popular among Russian chinchilla breeders (Figure 2 d).

This mutation appeared in the United States of America in the early 60s. The breeders who have devoted about 20 years to the development and refinement of this mutation are Tamara Tucker and Pamela Biggers from Amarillo, Texas (Kozlov, 2021).

The curl gene is another promising mutation for chinchilla fluff. The hair of such chinchillas looks from curly to clearly curled into rings. Similar names for this mutation are rex, curly, curl (Figure 2 e).

Curliness can be added to the elongated angora hair by crosses between the two mutations and a targeted selection of animals that have taken these two traits in their phenotype. Waviness or curliness will give additional advantages to the chinchilla's fluff - better twisting, grip of the chinchilla hairs in the product, both in woolen thread and in felt padding.

As traditional suppliers of wool and down for the production of warm and decorative products, people use sheep, goats, rabbits, alpacas ... In recent years, mink down has been added to this range, possibly as an alternative to the production of mink skins. We propose to expand this list to include chinchilla fluff. Moreover, in contrast to the short hair of the mink, the chinchilla already has an advantage in length due to the angora mutation. For the use of wool (down) as a material for clothing, the length of the hair, its thickness and the degree of uniformity in thickness are important (Table 2).

Table 2. Comparative characteristics of the wool and down of animals used for the manufacture of clothing

Type of animal	Hair thickness (fineness) µm	Hair length cm	Additional processing of wool (down)	Product type
Sheeps	30-35	7-10	Washing, sorting, waste from 40 to 70%	Coats, (overcoat), insoles, felt boots, socks
Merino sheep	14-23	8-12	Flushing, waste about 40%	Sweatshirts, sports thermal clothing
Downy goats	16-22	3-7	Rinsing, manual removal of coarse guard hairs, about 10% waste	Shawls, scarves, hats
Alpaca	27-36	15-20	Washing, manual sorting, about 10% waste	Coat, jacket, vest
RBS Alpaca *	19-25	До 30	Washing, manual sorting, about 10% waste	Shawls, scarves, hats, sweaters
Downy rabbit	14-20	4-6	Insignificant	Children's woolen products
Chinchilla	12-14	2,7-5	Slight or absent	Underwear**

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4. Conclusion

The advantage of chinchilla down is that its collection does not require primary washing and sorting. When chinchillas are kept on a mesh floor, as is arranged in A. Solovyov's farm, the collected fluff will remain clean - without any admixtures of shavings and pieces of hay. Chinchilla hair is practically the finest compared to other types of fluff used by humans. The diameter of woolen hair, which is potentially capable of causing irritation and allergic reactions on human skin, is from 25 microns and thicker. The thinner the hair from which the woolen product is made, the closer to the human body it can be worn. This means that insulated underwear can be made from chinchilla fluff - pajamas, underpants, both for adults and for children.

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