COMPARATIVE STUDIES OF PHYSICAL-MECHANICAL PROPERTIES OF NOBLE FURS

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The current work aims to highlight the structural differences of noble furs, more precisely of nutria fur and nutriette fur, especially following their behavior in various physical-mechanical analyzes. Noble furs have always had a special role in people's lives, over time the mankind crossed the seas and continents in search of the precious furs (noble furs). Since the 17th century, noble furs have been so appreciated that they have been used in certain geographical areas instead of money. In the past, noble furs were used only by those with a very good financial situation, but nowadays, noble furs are used on a large scale to make clothes, collars, and hats. The main purpose of this article is, therefore, to determine which of the two noble furs has superior physical and mechanical qualities. The reason why these two furs were chosen was that one is believed to be an imitation of the other on the market. The two types of fur were carefully analyzed by subjecting them to different types of physical-mechanical tests, the most relevant being: "Determination of tensile strength and percentage elongation", "Determination of tear strength", "Determination of shrinkage index", "Resistance at plucking the fur". All the tests were performed according to actual standards in ICPI accredited laboratory. The obtained results showed that although the two noble furs seem similar at first sight, the original has a superior quality, but also nutriette fur has proven to have some appreciable physical-mechanical properties.

Keywords: furs, physical-mechanical, nutria, nutriette

INTRODUCTION

The processing of furs and their use as clothing has a long history. If in the prehistoric period furs demonstrated the hunting virtues (trophies) and were used as such for bedding or to protect the body, much later, people discovered the useful and aesthetic value of clothing in these furs. Of course, for the achievement of this qualitative leap, the most important contribution had the evolution of the techniques of harvesting and processing of furs (Chirita, 1983).

Particularly high-quality fur types are awarded with the term of "noble fur", but the distinction to the other fur types is blurred and was not always the same in the various fashion epochs. The terms "semi-precious" and "non-precious" skins are also used gradually in trade (Deselnicu and Albu, 2007).

Among the noble furs is the nutria fur, which is highly valued, in its natural color it is light to rich brown, the most valuable furs being in the darker shades, but it may also be dyed. The designation of "noble" can be given to a common fur if it is considered to be an imitation of a noble fur. So, an upper hair lambskin, in itself a common fur, takes on a noble character if it is colored as an imitation silver fox. We also speak of noble lamb as Nutriettes, which are actually a fake nutria (Pastarnac *et al*., 1985).

The chemical composition of animal skins with fur consists of water, minerals, protein substances and fat substances and does not differ fundamentally from the chemical composition of animal skins used in tanneries. However, the quantitative rations of the different structural elements differ considerably (Chirita, 1983).

Nutrias grow most intensely until the age of one year. In good maintenance conditions, they can grow and develop until the age of two. The long and thick hair on the spine exceeds 30 mm in length, the fluff being 20 mm. The standard nutria hair

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color is brownish gray, the back has a darker shade, the abdomen lighter, the flanks have an intermediate color. The hair is thick and quite fragile, but shiny. The fluff is fine, twisted in a wavy shape, thin, beautiful, gray with a blue or brown shade. In Romania, in addition to standard nutria, colored nutrias are also grown: black, beige, silver and brown of different shades. In many colored varieties, the fluff on the abdomen is shorter than the standard nutria, but after the thickness of the fluff they are just as thick or even exceed the fur of the standard nutria (Chirita, 1983).

A large influence on the commercial value of nutria furs is their size. At the age of 6-7 months, the nutrias give a fur that can fit the size of the standard.

In the present-day fur production, physical and mechanical properties of skin tissue are essential.

The skins of fur-bearing animals possess a number of fundamental structural features. They usually have a very thin dermis, due to the fact that the hair coat is strongly developed.

The hairy covering is the totality of hairs that cover the animal's body. The hairy covering of most fur skins consists of hairs distinct from each other, in shape, size, color and structure (Chirita, 1983).

EXPERIMENTAL

Materials and Methods

The objective of the study was to present the differences in terms of physical and mechanical properties of noble furs, more precisely of nutria fur, compared to nutriette fur. So, the materials used were a piece of nutria fur and one of nutriette fur and were conditioned according to the standard.

To achieve the objective, the two types of fur were carefully analyzed by subjecting them to different types of physical-mechanical tests, according to actual standards, performed in ICPI accredited laboratory, the most relevant being: *Determination of tensile strength and percentage elongation* SR EN ISO 3376:2020, *Determination of tear strength* SR EN ISO 3377-1:2012, *Determination of shrinkage index* SR 5053:1998, *Resistance at plucking the fur* STAS 4180-90 Pt.4.4.

The equipment used was the traction test machine “Tinius Olsen”.

RESULTS AND DISCUSSIONS

In the present paper, the studied nutria fur is a standard brown one, which can be observed in the pictures below, alongside the nutriette fur.

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Figure 1. Images of standard nutria fur (left) and nutriette fur (right)

In the displayed graph it can be seen the behavior of the two furs at an elongation of 30N. The nutria fur registered an average value of 33.94% after testing 10 samples, while the nutriette fur had an average value of 23.92% at the same test, carried out under the same conditions.

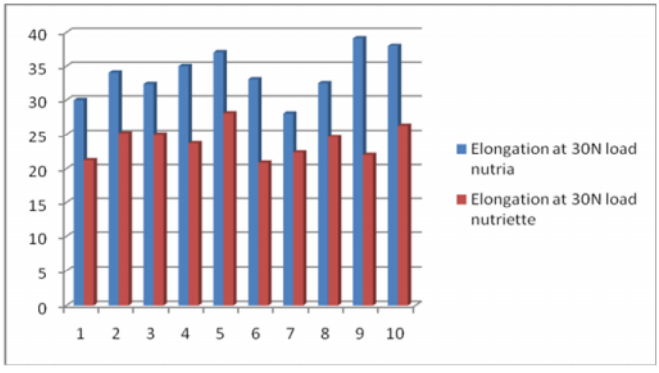

Figure 2. Variation of elongation at 30N for the two types of furs

The second graph shows the differences in values at elongation at break for the two furs, the analysis being also performed on a number of 10 samples. In this case it can also be seen that the nutria fur is shown to be superior to the nutriette fur, the average value registered being one of 65.34%, compared to one of 45.32%.

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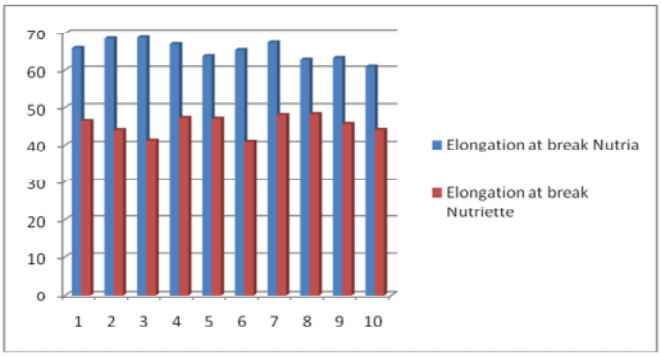

Figure 3. Variation of elongation at break for the two types of furs

The third graph shows the breaking load, the differences between the two furs being similar to the two previous analyses. In other words, the nutria fur has proven to have a better breaking load than the nutriette fur, the average value for it being 153.12 N, compared to 139.25 N.

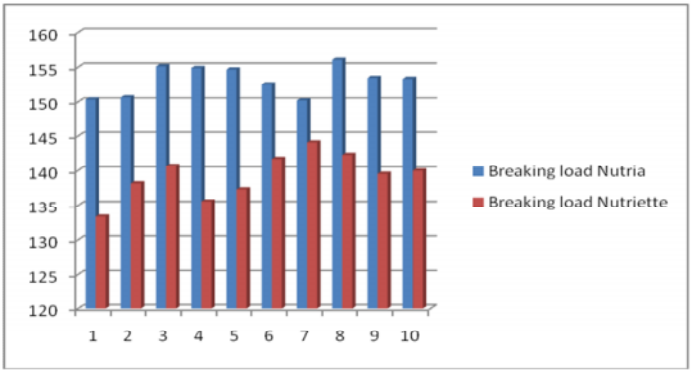

Figure 4. Variation of breaking force for the two types of furs

The elongation at 30N, the elongation at break and the breaking load are results obtained from a single complex analysis called “Tensile strength and percentage elongation”, made with the help of the traction test machine “Tinius Olsen” and fully respecting the specific standard for this analysis (SR EN ISO 3376:2020).

Regarding the tearing strength of the two furs, the nutria fur seems to be better again, the average value being 26.83 N, while the nutrient fur reached an average value of 20.03 N. To obtain these numbers, 10 samples cut from each fur were tested once again. The results can be better seen in the graph below.

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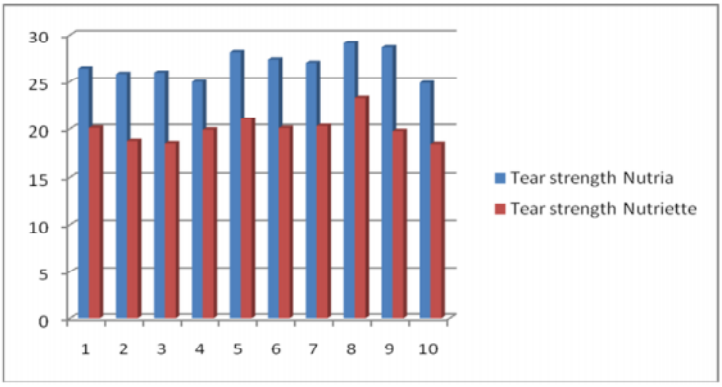

Figure 5. Variation of tear strength for the two types of furs

This analysis is also performed using the traction test machine "Tinius Olsen" fully following its standard (SR EN ISO 3377-1:2012).

Another extremely relevant analysis for this study is "Determination of the shrinkage index", which revealed that once again nutria fur is visibly better. According to this analysis, performed based on its standard (SR 5053:1998), at the temperature of 70°C the nutria fur has a shrinkage index of 3.2%, while the nutriette fur holds a value of 4.12%.

The only analysis that gave identical results was the one referring to the quality of the hair, "Resistance at plucking the fur" (STAS 4180-90 Pt.4.4) and was proven that both furs are great in this regard.

CONCLUSIONS

Although the two noble furs seem similar at first sight, the original is always of superior quality. As mentioned at the beginning of this study, the nutriette fur was specifically designed to be a more affordable nutria fur substitute. It should be noted that although it did not rise to the level of nutria fur, the nutriette fur has proven to have some appreciable physical-mechanical properties.

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