ACADEMICIA
An International Multidisciplinary Research Journal
(Double Blind Refereed & Peer Reviewed Journal)

DOI: 10.5958/2249-7137.2021.01332.X

TO THE QUESTION OF EVALUATION OF QUALITY INDICATORS OF FUR PLATES FROM WASTE

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ABSTRACT

The problem of processing and rational use of waste from leather and fur production in recent years has become especially urgent all over the world. The use of fur waste for the manufacture of products, a wide variety of fur waste and the resulting plates sets the task of determining their properties and conducting appropriate tests to predict quality indicators at the design stage.

KEYWORDS: *Fur Production, Modular Design, Innovative Technologies, Resource-Saving Technologies, Karakul Breeding, Fur Haberdashery, Ornamental Composition, Leather Fabric.*

INTRODUCTION

The problem of processing and rational use of waste from leather and fur production in recent years has become especially urgent all over the world. This is due to the fact that in the production process of natural leather and fur semi-finished productsa significant amount of waste is generated, containing up to 50% protein substances and other by-products.

The efforts of manufacturers of fur and leather products are aimed at reducing material losses and rational use of waste. To do this, they plan to produce small leather goods, use patchwork technology, combined cutting according to rational layouts of patterns, use various types of equipment that provide low-waste cutting technology. However, it is not possible to achieve full utilization of waste. A significant part of them have not yet found application and are taken to dumps, which, in addition to material losses, leads to environmental pollution.

The main reason for the incomplete use of waste generated in the process of cutting fur semi-finished products and leather materials is that they have a complex irregular shape and are characterized by a wide variety in size and configuration. This is due to the type of semi-finished product, the configuration and size of the skins, their quality, cutting methods and other factors. Another feature that complicates the process of processing waste of fur semi-finished products (FSFP) and leather materials is their belonging to different topographic areas of skins. Depending on this, the waste has different indicators in terms of the degree of density and height of the hairline, the direction of the hair and the thickness of the skin tissue, which greatly complicates their use for the manufacture of high-quality products. As a result, more than 50% of natural fur waste at fur factories remains unused and is an important resource conservation reserve [1].

The use of FSFPwaste in the manufacture of products, a wide variety of the latter and the resulting plates sets the task of determining their properties and conducting appropriate tests to predict quality indicators at the design stage.

The aim of the study is to increase the efficiency of using waste of fur semi-finished products generated in the manufacture of products from natural fur. The object of research is a fur flap and FSFPwaste of various sizes.

RESEARCH METHODOLOGY

Various methods of making fur skins and plates are currently known. The selection of the flap into the plates was made from homogeneous groups of fur, taking into account the requirements for fur clothing.

The traditional way of using FSFPwaste for clothing is the manufacture of fur plates collected from the largest fragments of fur skins (mainly peripheral areas and inter-medical waste), the shape and size of which depend on the waste used. The flap of most of the semi-finished fur product is cut into pieces having various geometric shapes, as well as into lobe and transverse strips. In this case, the waste must be of high quality, with a uniform hairline, the direction of which must be taken into account when forming a fur plate.

A flap of the astrakhan-lambskin group is sorted according to the type of curl. Such a flap is cut into pieces of any shape. At the same time, defects of the scalp and skin tissue are removed. In this work, the manufacture of fur plates from the flap was carried out according to the traditional

method: sorting, cutting off and fitting the flap in size, stitching the strips into plates of specified sizes and shapes (rectangular, square, trapezoidal, etc.), moisturizing and straightening, leveling each row and eliminating wrinkles, drying and performing traditional finishing operations [2]. For the processing of fur waste, a flap of high-value parts of skins was taken: mink, muskrat, astrakhan and broadtail.

Strips of the largest possible size were cut from the furrier's flap and parts of the skins. Then the strips were connected to pieces of a skin flap 2,0 cm wide. chalk, measuring ruler, patterns, weight, and other tailor's tools by hand.

For a complete assessment of the quality of fur plates, it is important to reasonably select a set of quality indicators, not missing a single significant indicator, but at the same time not overloading the complex with insignificant ones, which could lead to an increase in the cost of the quality assessment process. When starting the choice of quality indicators, it is necessary to study their nomenclature and classifications in accordance with [3]. These standards provide a wide range of quality indicators (QI). However, the standards do not include the entire range of QIs, but only those that have a certain weight and meaning. When selecting, it is also necessary to take into account the indicators characterizing the purpose of future products and indicators (parameters) that affect the processing of raw materials. The comprehensive assessment methodology [4] provided for:

- Selection of the nomenclature of quality indicators of the evaluated products;

- Determination of the values of these quality indicators;

- Comparison of the values of the selected quality indicators of the evaluated products with the base ones.

The choice of quality indicators consisted of two stages:

- Preliminary selection of indicators;

- the final selection of a set of indicators.

As a result of the analysis of the literature and preliminary selection, the following set of QIs was obtained for a comprehensive assessment of the quality of fur plates from waste (Xi): X_1-thickness, X_2-breaking load, X_3-breaking elongation, X_4-surface density, X_5-wear resistance, X_6-heat resistance, X_7-rigidity, X_8-air permeability, X_9-vapor permeability, X_{10}-drape, X_{11}-elasticity, X_{12}-softness, X_{13}-artistic and coloristic design, X_{14}-texture, X_{15}-mass, X_{16}-abrasion, X_{17}-deformability. [5] ...

For the selection of the most significant properties, the weight of the above QIs was established using the method of a priori ranking [5]. The expert assessment was carried out with the participation of leading specialists in the leather and fur industry and scientists working at the specialized departments of TITLI. The number of experts (n) was 12, indicators of properties (m) 17. The results of the questionnaire and their mathematical processing are shown in table 1.

The degree of expert agreement was assessed using the concordance coefficient W (1). The value of this coefficient can be in the range from 0 to 1. In our case, the calculated value of the coefficient of concordance was W = 0,62.

$$W = \frac{\sum_{i=1}^{n} (S_i - \bar{S})^2}{\frac{1}{12} m^2 (n^3 - n) - m \sum_{j=1}^{m} T_j} \qquad (1)$$

The practice of conducting expert assessments of quality established the following ranks of qualification of the concordance coefficient: W = 0 there is no consistency of expert opinions, W = 0,4 ... 0,6 is a significant connection, with W≥0,6 there is a strong connection. Analysis of the results of evaluating the properties of fur plates showed that there is a significant connection between the opinions of the respondents, since W = 0,62. The experts' opinion is not accidental, since the calculated value of the Pearson-χ^2 criterion at a significance level of 5% χ^2= 119,04 is greater than the tabular value χ^2_{tab} = 26,3, which is confirmed by the above figures.

TABLE 1. MATRIX OF RANKS FOR ASSESSING THE QUALITY INDICATORS OF CANVASES FROM PMP WASTE

Qualityindicatornumber	Эксперты												S_i	Weight factors
	1	2	3	4	5	6	7	8	9	10	11	12		
1	11	14	14	14	10	11	11	11	10	10	10	11	137	0,0411
2	12	10	12	15	8	6	12	14	7	11	15	12	134	0,0429
3	3	3	2	3	11	1	2	3	5	6	3	3	45	0,0974
4	6	2	3	2	4	9	3	2	4	3	7	2	47	0,0962
5	15	5	4	9	14	2	5	5	8	5	8	5	85	0,0729
6	2	6	6	4	6	7	6	6	14	2	6	6	71	0,0815
7	10	8	8	10	13	10	10	4	15	12	14	10	124	0,049
8	14	15	9	8	5	8	8	8	9	13	13	8	118	0,0527
9	9	12	11	11	9	12	9	9	13	9	9	9	122	0,0502
10	1	1	10	12	7	4	7	12	1	1	2	7	65	0,0852
11	13	13	13	13	2	13	13	13	3	14	12	13	135	0,0423
12	4	9	7	5	1	5	4	10	6	7	5	4	67	0,0839
13	5	4	1	1	3	3	1	1	2	4	1	1	27	0,1085
14	7	11	16	7	15	15	14	16	11	16	16	14	158	0,0282
15	8	16	15	6	12	16	15	15		15	4	15	153	0,0313
16	16	7	5	16	16	17	17	7	12	8	11	17	149	0,0337
17	17	17	17	17	17	14	16	17	17	17	17	16	199	0,0031
T_1														
$\sum_{i=0}^{n} S$ = 0.. ∗ 1)	153	153	153	153	153	153	153	153	153	153	153	153	**183 6**	1

The results obtained allow us to make the following preliminary conclusion about the significance of the selected quality indicators. Seven quality indicators are significant and they are arranged in the following row in decreasing order of importance:

1) artistic color scheme - X_{13};

2) elongation - X_3; [7].

3) surface density - X_4; [8].

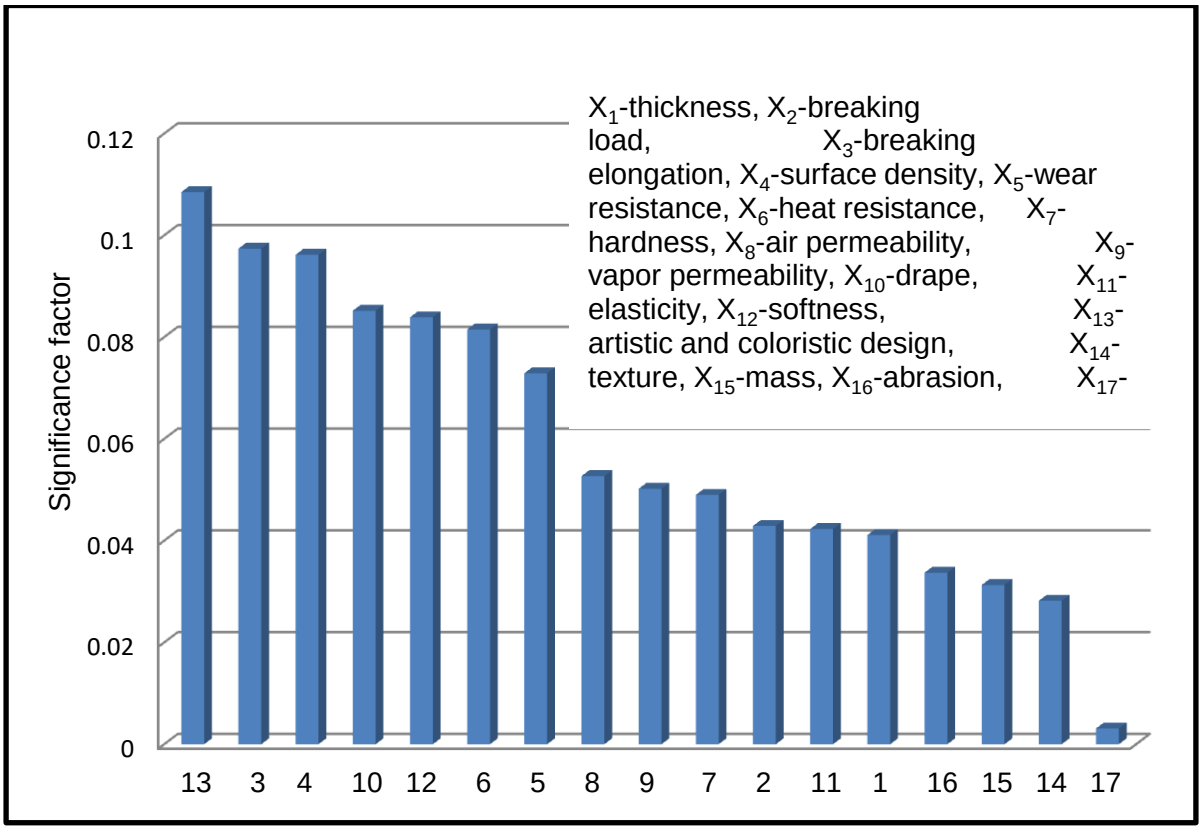
4) drape - X_{10}; [9].

5) softness - X_{12}; [10].

6) heat-shielding properties - X_6; [11].

7) wear resistance –X_5. [12].

Figure 1 shows an a priori diagram of the quality indicators of fur plates, built on the basis of expert assessment data.



In the first place, the experts determined the aesthetic requirements of the materials made from the recruited fur flap, therefore, their artistic and coloristic design should be at a high level, and the products should be light and soft, which is indicated by the surface density and softness. Plates must meet modern fashion trends, provide expressive appearance, beauty and conformity to the consumer's appearance. Along with this, the elongation-plasticity of fur skins, which

determine the quality of furrier production processes and the shape of the future product, are important for the considered plastinof FSFP waste.

When carrying out calculations, the relative weightings of significant indicators were also calculated.

In accordance with the selection of the QI nomenclature, to assess the quality of harvested fur plates from fur skins waste, experimental studies were carried out on various semi-finished products of FSFP. The following properties of the plates were experimentally determined: density, thickness, heat retention, mechanical properties and drape [13].

In accordance with the made choice of the nomenclature of QI of fur plates from waste, at the next stage of work, a comprehensive assessment of all working samples of fur plates was calculated. Considering that quality assessment is the first and main stage in the development and operation of the quality management system and clarification of the nomenclature of properties and QIproducts, an objective comprehensive assessment of the quality of experimental samples are the most important stages in organizing fur production, including in the manufacture of outerwear using fur waste. Since the experimental samples are intended for the top of the coat, they are used as the base QImaterial for the comparative assessment of waste in accordance with the recommendations of TsNIISHP [15]. selected woolen fabric with the following characteristics: elongation-23%, surface density-450g / m2, drape coefficient -65%. To convert the natural indicators of the quality of experimental samples into dimensionless, the following formula was applied:

$$Z_i = \frac{X_i}{X_{i\text{баз}}} \quad (2)$$

The data for calculating the definition of complex quality indicators are given in Table 2.

Таблица 2

Name of experimental samples	Quality indicators				Complex indicator Q
	Artistic color scheme, points Z1	Elongation, % Z_2	Surface density, gr/m^2 Z_3	Drape * Z_4	
Astrakhan	5	0,96	2,16	1,41	2,48
Karakul + lining	5	3,13	2,30	1,39	3,07
Broadtail	5	1,26	0,92	1,42	3,06
Swallowtail + lining	5	1,13	1,18	1,41	2,28
Nutria	4	2,22	2,16	-	
Nutria + lining	4	2,19	2,32	-	
Mink	5	2,21	1,08	1,40	2,53
Mink + lining	5	0,30	1,24	1,39	2,09
Relativeweight	1,4875	1,3353	1,3190	1,1672	

* The drape of the experimental samples was determined by the disk method.

To determine the complex quality indicator Q, the formula was applied:

$$Q = \frac{\sum_{i=1}^{n} Z_{ji} * ¥_i}{\sum_{i=1}^{n} ¥_i} \quad (3)$$

Thus, the studies carried out have shown that all samples of fur plates have a certain level of quality, which is reflected by the value of the complex quality indicator, in turn, these quality levels are not lower than the base material indicator. At the same time, it is necessary to highlight the astrakhan fur with a lining as the best in terms of a comprehensive indicator of quality, followed by a broadtail, astrakhan, mink, broadtail with a lining and a mink with a lining. conduct their comprehensive quality assessment.

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