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New Technological Approach for Treatment of Karakul Hides

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ABSTRACT: This article discusses a new technological approach in the processing of karakul hides and comparing it with the traditional method. The results of chemical analysis and IR spectroscopy of hides processed by the studied method are presented, as well as the advantage of this method.

KEY WORDS: karakul hides, pickling process, milky production waste – whey, whey composition, carbohydrate component, mucopolysaccharides.

I.INTRODUCTION

Bread pickling and softening are classic methods of making fur hides and have been used for a long time in the processing of the entire assortment of fur raw materials, since they provided the highest quality leather tissue. The softness and ductility of pickled hides are still taken as the standard for the highest quality semi-finished product when assessing the effectiveness of the developed methods of dressing.

Currently, bread pickling is used in the processing of purebred karakul by dry-salted method of canning and partially in the manufacture of squirrel and mole hides, as well as for canning the karakul hides group.

Pickling should be considered as a complex biochemical process in which manifested the total effect of the complex of plant enzymes that contained in flour on the protein-carbohydrate complexes of connective tissue and moreover the effect of a mixture of organic acids resulting from fermentation.

In this case, the effect of a mixture of organic acids (mainly lactic acid) is manifested in two stages - at the beginning of pickling at low acidity –4–6 g / l (pH = 4.0–4.5) and at the end of pickling at higher acidity –16 −20 g / l in terms of lactic acid (pH = 3.8−4). In the first stage, the effect of weak pickeling predominates, contributing to the leaching of carbohydrate components and loosening of the fibrous structure. At the end of pickling, the effect of ordinary organic pickling is additionally manifested. Consequently, mixtures of organic acids under favorable conditions (temperature 380 ° C, pH = 3.8–4.5) mainly contribute to the removal of mucopolysaccharides that adhere structural elements and partial dehydration of the dermis.

The total effect of the complex of enzymes and a mixture of organic acids under favorable processing conditions provides a characteristic structure breakdown, inherent only to pickling, at which such high ductility and softness of the skin tissue are achieved.

The long duration of pickling and the irrational use of flour in the processes of fermentation and acid formation are due to a gradual decrease in the pH of the solution by the end of the fermentation below the optimal value for the action of the complex of plant enzymes and a slight hydrolysis of starch with the formation of a mixture of organic acids. [2]

In a purpose of practical test may be taken the lactic whey that is obtained from dairy waste containing lactic acid in its composition for pickling of dried salted canned pure-bred karakul hides.

II.RESEARCH METHODOLOGY

Currently, in order to improve the environment and obtain additional profit in production, special attention is paid to technologies without waste. In dairy plants, the secondary raw material is whey, which remains after curdling and

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straining of milk. Whey is obtained in the production of hard cheeses, sour cheeses and cottage cheese, and basically all this liquid, despite its valuable properties, is poured into the sewer as a waste product.

Whey is approximately 93.7% consists of water. The remaining 6.3% includes all the best that is in milk. The main part of whey solids is lactose, which prevents the formation of unwanted fat, and milk sugar. Whey contains a full range of B vitamins, as well as vitamin C, nicotinic acid, choline, vitamin A, vitamin E and biotin. Whey also contains calcium, magnesium, and probiotic bacteria. Also whey contains lactic acid, which is so necessary for pickling of karakul hides.

Whey was prepared at a dairy plant by fermentation of milk (cottage cheese, cheese) and looks like a greenish-yellow liquid with a concentration of lactic acid 5-30 g / dm3.

We have made a research on process of pickling of purebred karakul, where milk whey obtained from waste products of dairy production was used instead of oatmeal. In this case, 50%, 75% and 100% concentrations of whey were used. A few samples of karakul hides after soaking operations

In parallel with these processes, karakul hides were pickled with barley flour. Before loading the hides, the acidity of the whey was checked and sodium chloride was added in amount of 40 g / l. The acidity of the whey in terms of acetic acid was 1.5 g / l, respectively; 2.3 g / l and 4.4 g / l. Pickling was carried out at a temperature of 350C.

In the process of pickling, the condition of hair weakening was controlled and, upon detection, sodium chloride was added up to 60 g / l. Acidity in the process of pickling gradually increased and on the sixth day it reached 12 g / l in terms of acetic acid in a pickling mixture was implemented milk wheywith concentration of 100% as well as 5.7 g / l and 7.3 g / l, respectively, in pickling mixture 50% and 75% concentration of whey.

To conduct research at different stages of work, standard methods were used (potentiometric titration method, histological analysis of stained sections of skin tissue).

The reliability of the results was ensured by the selection of the required number of parallel measurements of the indicators of the studied objects.

The end of pickling in a milk whey of 100% concentration was determined by the achievement of loosening of the skin tissue and the appearance of a slight weakening of the hair in the inguinal parts of the hides.

In the process of pickling, it should be emphasized that the observed slight destruction of the main protein - collagen cannot be a decisive factor providing such a deep loosening of the fibrous structure. Modern ideas about the role of the carbohydrate components of the interfiber substance in the manufacture of fur hides make it possible to re-examine the quasil mixture on the microstructure of the skin tissue.

A study of the processes of pickling and softening showed that changes in the microstructure of the skin tissue are to a large extent associated with effects not on collagen, but on protein - carbohydrate complexes of interfiber substance, which adhere structural elements.

Despite the low carbohydrate content in the dermis of animals (1-3%) compared with collagen (73-81), they are of great importance in the processes of fur raw materials production. Carbohydrate components are part of the connective tissue of mainly interfiber substance in the form of complexes with proteins connected by covalent and other less strong connection. Therefore, their removing is difficult and can be achieved only with the complete hydrolysis of protein - carbohydrate complexes. The presence of a strong connection between the elements of the collagen structure and carbohydrate components is confirmed by increased heat resistance and less solubility of such compounds. [2]

Carbohydrate components - mucopolysaccharides play an important role in collagen structuring. In the process of embryonic development, elements of a collagen structure are formed in the gelatinous interfiber substance, which include mucopolysaccharides. They are sorbed on the surface of fibrils in the form of thin insulating seals - constrictions, which protect adjacent fibrils from sticking together and determine the difference between the surface zones of the fibrils and the deep ones due to the appearance of the primary transverse striation.

It is very difficult to completely remove mucopolysaccharides from the dermis. The total number of mucopolysaccharides,%, in the dermis of animals of different age groups is not the same: in karakulcha - more than 3, in karakul – 1.4–2.6, in sheepskin –1–1.8. The greatest number of mucopolysaccharides is contained in the rump side of skins, the smallest - in the floors. A higher content of carbohydrate components was found in the papillary layer than in the reticular and subcutaneous muscle layers. They line the inside of the root vagina of the hair bag. Therefore, excessive removal of mucopolysaccharides from the papillary layer can sometimes cause a weakening of the connection between the hair and the hair bag.

Thus, despite their relatively low content the carbohydrate components of connective tissue play an important role in the formation of the fibrous structure, forming strong complexes with proteins and increasing the resistance of the dermis to various influences. Removal of a certain portion of carbohydrates sticking structural elements from the interfiber substance leads to loosening of the skin tissue.

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There is some optimum removal of carbohydrate components, the violation of which can cause undesirable changes in the mechanical properties of the dermis and especially the weaker papillary layer. While setting processing parameters with various reagents, no need to completely wash out all the carbohydrate components that make up the structural elements and the interfiber substance. However, within the optimum, there is the following independence: the more mucopolysaccharides are removed, the finer beam separation is achieved.

III.EXPERIMENTAL RESULTS

While pickling is on process, the prevailing formation of lactic acid is a limiting factor for the development of putrefactive microflora (bacillus subtillus, yeast, mucous bacteria) and ensures high stability of microbiological processes. Lactic acid bacteria first surround the yeast cells and then penetrate the cells, causing their destruction. Increasing the temperatures, acid accumulation and mixing of the mixture prevent the development of unwilling microorganisms. By the end of pickling, a stable system of lactic acid bacteria is created.
After pickling in milk whey mixture, the skins were squeezed in a centrifuge and evenly dried over the entire area. Next, pickled hides were subjected to a number of chemical analyzes, such as moisture content, content of mineral substances, content of fatty substances, and the content of protein substance on the content of total nitrogen. Below are the results of these analyzes.

Barley flour treated karakul hides

№	The name of indicators	Results of analysis
1	Moisture contents	9,2%
2	Mineral contents	6,2%
3	Fat content	9,3%

100% milk whey treated karakul hides

№п/п	The name of indicators	Results of analysis
1	Moisture contents	8,51%
2	Mineral contents	7,02%
3	Fat content	10,36%

75% milk whey treated karakul hides

№п/п	The name of indicators	Results of analysis
1	Moisture contents	7,22%
2	Mineral contents	6,84%
3	Fat content	12,84%

50% milk whey treated karakul hides

№п/п	The name of indicators	Results of analysis
1	Moisture contents	8,9%
2	Mineral contents	6.4%
3	Fat content	14,3%

Protein substance was determined by the Kjeldahl method. A portion of the skin was weighed at 0.1 g. Burned with concentrated sulfuric acid. Conversion rate 5.82%

№	Name of raw material	Mass fraction of nitrogen,%	Result of protein substance
1	Barley flour treated karakul hides	14,1	79,4
2	50% milk whey treated karakul hides	14,4	84,3
3	75 % - milk whey treated karakul hides	13,8	80,6
4	100% - milk whey treated karakul hides	12,9	75,1

An analysis of the absorption of the IR spectra of different polypeptides and proteins provides information on the conformation of their molecular chains and also makes it possible to determine the intramolecular or intermolecular interaction in polymers due to hydrogen connections and to establish the nature of the interaction of proteins with various tanning compounds. [3] Based on this, we studied the experimental and control hides using

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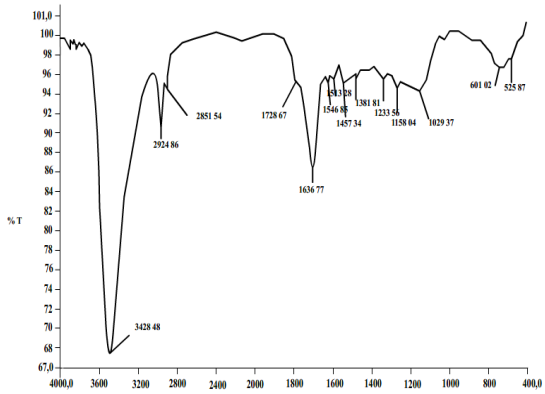
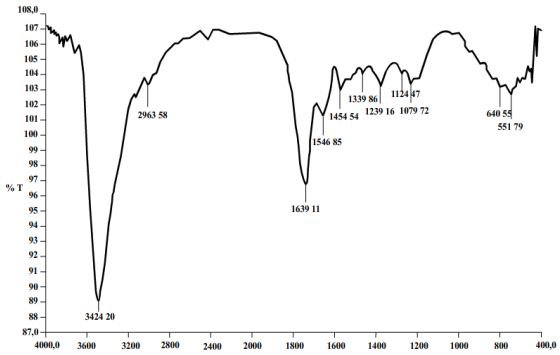
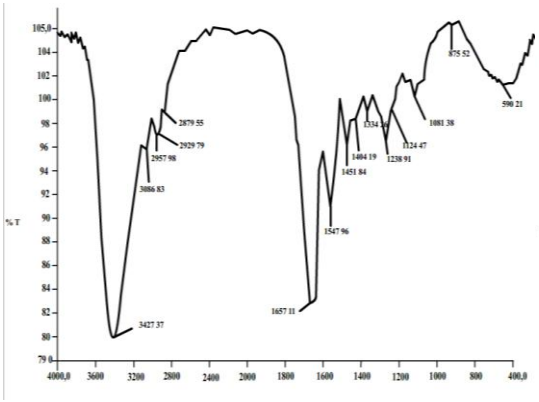
IR spectroscopy, the results of which are given below



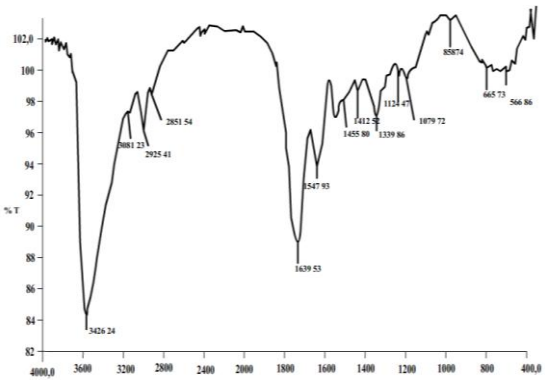
IR spectroscopy of Barley flour treated karakul hides



100% - milk whey treated karakul hides



50% milk whey treated karakul hides



75 % - milk whey treated karakul hides

IV.CONCLUSION

Analyzing the results of research on the pickling of karakul hides with milk whey, we can conclude that the use of whey in the process of picklingkarakul hides makes it possible to save a valuable food product - barley flour and a large amount of water. When using wastes from food production of whey in the process of pickling karakul hides, a fine separation of collagen bundles is achieved, which ensures softness and ductility of the skin tissue?

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