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Increasing in the Surface of Moisture Evaporizatation from the Underkin Glue (Mezdro) Layer of Karakul Skin in the Course of Drying

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Abstract – The modes of skins dry-out at the account of increasing in the surface of moisture evaporization from the skins during sticking onto cloth and as well as the designed scheme of drying-up the underskin glue (mezdro) layer in the course of primary processing are specified in the article.

Keywords – Karakul; skin; dry-out; drying chamber; air temperature; drying and suction area; air consumption; drying up material; case; shelf; carriage cart; transporter; fiber diameter.

I. Introduction

Karakul breeding is one of the most important branches if Central Asian countries and Kazakhstan. Karakul is considered to be one of the most valuable products of export as fur commodities, and it is in big demand as in our country so in foreign countries which facilitate providing the hard currency inflow to our region.

In production of karakul skins the drying is one of the most important process operations, and at the same time with moisture receding the irreversible phyisics - mechanical and biochemical variations occur as well.

Karakul skin is as complicated structure, consisting of two parts: leather fiber and haired cover. Leather fiber, in its turn, divided into three layers: epidermis, dermis and underskin cell [2, 3, 4, 11].

Epidermis is as outside layer of the skin in material of multilayer keratinized having the epithelium surface; and water practically doesn't penetrate it and has highly thermal resistance of heat (thermal) conductivity.

Dermis composes the major part of skin fabric and is compact connecting fabric, consisting of collagenous fibers, main substance and cell elements.

Underskin cell is formed by loose interlacing of collagenous fibers. This layer will not influence particular resistances against the moisture relocation and the process followed by its evaporization.

Skins hair consists of three concentric layers: cuticula, cortical layer and the core. Such structure will not allow high temperatures on heating the haired cover. Therefore the moisture, containing in the mass is relocated mainly into the dermis under heating.

Base on colloidic – physical properties leather fabric of the karakul skins may be related to capillar - porous bodies, and skins hair will be related to the colloid. Moisture at skins will form physical – chemical connection with the leather fabric and haired cover. Moisture transfer inside the fabrics will occur throughout the capilliars in a diameter 1,5-2,2 mkm.

It should be considered, that thickness of mezdra (leather fabric) influences significantly greatly onto the process of moisture evaporization, and it varies highly enough margins (thickness ratio of the thick mezdra with respect to thin glue skins (mezrdo) is 1,6…2,3 times). Extended characteristics of the leather fabric according to Zakirov M.D. are shown in table 1 [3, 4].

Table 1. Thickness of leather cloth made of karakul skin at pair, drysalted and pickled states

Type of raw material	Pair	Drysalted			Pickled one	
	mm	mm	% to karakul	% to pair	mm	% to dry-salted
Golyak Karakulcha Karakul-karakulcha Karakul Yakhobob	0,36 0,78 1,03 1,12	0,31 0,65 0,89 0,98	31,6 66,4 90,9 100,0 229,6	86,2 50,9 86,5 87.5	0,24 0,52 0.69 0,78	77,4 80,0 77,6 79,6 82,7
	3,0	2,55		75,0	1,86	

In the course of drying the skins it is obligatory to consider the properties of the technologic process, reseding and salting the skins being performed [7].

In all processes of primary treatment of the skin before drying the permanent control over its quality will be performed.

At present drying the Karakul skins is varried out at natural open small areas by means of the heavy handiwork in spreading and fixing the skins. In natural drying due to the uncontrollable parameters and process, noneliminating defeciencies of skins as will be appeared as burning and keratinization of the leather fabric. Long duration of drying, lasting 6…12 hours, and lack if setting will lead to increased shrinkage of skins area, that is equal 15…20% [6, 8].

Inequal drying (part of the skins will be dried-up, but another part is dried out) suddenly decreases the quality and grade of the raw materials being produced. In the event if defeciencies are revealed then the selling price at the world market will be deacreased to 11...34%. The price of rejected skins will be at most 10... 15% from the qualitative skin. At several cases the Karakul output with technical defeciency will reach 40%[4].

At present in most karakul breeding farms the different machines for drying thje karakul skins has been spread. Last years the tendencies to the optimization of temperature-humid modes on drying process considering the stabilization of skins quality are identified. Drying the skins at comparatively lower temperatures and specific consumption of the drying agent is one of such ways [10].

II. Materials and Methods

The following items are the major parameters, describing the process of karakul drying:

- air temperature, incoming onto the material being dried and dry up chamber;
- temperature of air pumped out from the drying area;
- air temperature before and after dry up;
- air consumption per unit of materials number being dried;
- duration of being situated material to be dried up at the hot air area;

- duration of being situated material to be dried up at the suction area;
- distance between cases or shelves at blow-out and suction;
- number of cases or shelves at one carriage cart;
- number of carriage carts on the transporter.

All mentioned factors in either case influence onto the feature of proceeding process of drying the karakulchi, its energy capacity [9].

Besides that the following factors will influence onto the process if drying at lower degree:

- type of material from which the cloth is manufactured;
- force for tensioning the cloth by springs;
- holes diameter and its number at perforated of the frame and duty cycle of shelf;
- fiber diameter and etc.;
- way of installation the helio-receiving surfaces (allocation relatively horizontal and sides of «sunny boilers » horizon);
- climatic conditions in the drying period;
- velocity of air movement at helio-air heater.

Therefore in effort to research energy (power) costs at heliodrying device imitation modelling method by applying the simplified versions of Monta-Karlo method is used [1]. And the following items are accepted as major parameters for imitation modelling:

- outside air temperature tou;
- air termperature, supplied to the drying chamber Qd;
- relative humidity of air temperature φ_H;
- intensity of solar radiaton Qs ;
- capacity of the drying device (number of skins, inserted into the chamber simultaneously) Ns;
- required duration of drying process τ_c;

Let's determine allowable margins of the selected parameters, base on realistic opportunities and constructible considerations.

Outside air temperature in January-February (Republic of Uzbekistan) varies within the margins of t_{ou} = -15…+25^{0}C.

Air temperature, supplied to the drying chamber - t_{dr} = +25…+45^{0}C.

Relative humidity of air in winter period - φ_H = 30…90%.

Intensity of solar radiation (straight and diffused) at day-time - Q_s = 80…220Wt/m^2.

Capacity of the drying device - N = 50…200 pcs.

Duration of drying process - C = 5…10 h.

Let's accept the value of the heat losses of drying chamber in according to recommendations based on the enlargened indicators.

As calculations for winter period show that the drying device operation under combined system of heating energy expenditures will amount 2300…2500 kJ, part of those expenditures will be compensated when the solar radiation onto the surface of helio-airheater is received.

III. THE RESULTS AND DISCUSSIONS

Properties of receding process of moisture from the skin can be modeled base on scheme, shown in the figure 1. Conditionally it is acceptable, that underskin glue (mezdro) layer is aggregate of the spheres in diameter *D*. In skins the drying parameter of sphere diameter will decrease until *d* value. It will lead to decreasing the thickness of layer from β_{st} (starting thickness of layer) to β_{fin} (finishing thickness of layer).

Distance between the points of contacting the spheres among themselves will be as below:

$$A = D / \sqrt{3}, m \qquad (1)$$

Above distance when the skins sticked onto the semispherical fields are dried, will be varied at few margins, that facilitate preserving the primary dimensions of skins in drying. Deformation will take place mainly at thickness of skin layer. In the course of drying it varies significantly enough.

Skins sticker onto to the supporting surface only by the one side will lead to inequal deformation in drying the skin, tensions between the separate layers will be originated in it; buckling and other negative phenomens will be noticed.

Therefore in drying the skins it is necessary to use two-sided sticker.

Increasing the surface of evaporization at the underskin glue layer side at the account of contact area of threads is other positive effeciency od using the hygroscopic cloth for setting the skins. Figure 2 shows the scheme of contacting the underskin glue layer with threads of tare fabrics.

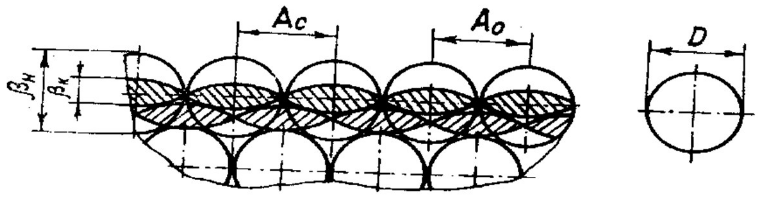

Fig. 1. Designed scheme for reseding the moisture on underskin glue (mezdro) layer drying.

Using the threads of big diameter d_{th} , located as much as closer to each other will be the best condition moisture transfer.

Surface area of evaporization through tare fabric will be increased proportionally to enlarging the specific surface of evaporization, and it is determined in accordance with the below formula:

$$L_{evap} = N_H \cdot \pi \cdot d_H \text{ м} , \quad (2)$$

where, $N_н$ – number of threads tare fabric per elementary section unit, pcs.

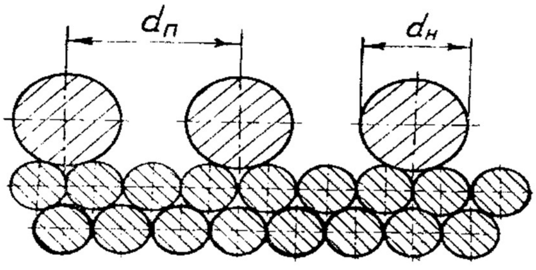

Fig. 2. Scheme of increasing in the surface of moisture evaporization from the underskin glue (mezdro) layer in gluing onto the fabric.

N_{th} value depends on density of threads interlacing among themselves and its marginal value is determined base on the following formula:

$$N_н = L/(d_н + d_n), pcs, \quad (3)$$

where, L – length of section to be analyzed, m;

d_n – distance between the separate threads, accepted as equal d_n = (0,3…0,4) d_{th} mm.

IV. Conclusions

On the base of numerical analysis it is established, that thread having a diameter d_{th} = 0,05…0,07mm shall ensure the greatest surface of evaporization, however the price of fabric made of threads of such a diameter is significantly high; and thefeore it is allowable to use fabrics, made from the big diameter threads (d_{th} = 0,8…1,2mm).

REFERENCES

[1] Abduganiev Z. Heliodevice for drying the karakulchi skins. Heliotechnics. Tashkent. 1994 №5. p.70…71.
[2] Bragis O.I. Skin and leather structure of the Karakul lambs. - M.: Kolos, 1968. p.228.
[3] Zakirov M.D., Sharafudinov F., Khamrakulov A. Researching the Lamb skin (fur bearing)sience. - Tashkent: Teacher. 1978. – p.210.
[4] Instruction for primary processing of karakul – Lamb skin raw material (fur bearing). - M.: State publication house,1967. – p.12.
[5] Ivanov V.M. Sweet-dry preservation of the karakul skins //Sheep breeding, 1961, № 2. – p.28…29.
[6] Kaliaskarov A.S. Karakul breeding with basis of commodity research. - M.: Kolos, 1969. – p.174.
[7] Kaliaskarov M. Substantiation of technologic process and parameters of the karakul skins drying device at farms conditions // author's summary. Dissertation work on application for Scientific degree of candidate of Technical Sciences. (TS). – Almaty, 1984. – p.24.
[8] Karakul- lamb skin (fur bearing) raw material. - M.: Publication house of Standards. 1972. – p.47.
[9] Lykov A.V. Heatmass exchange. Reference book. - M.: Energy, 1978. – p.479.

[10] Patent of Russia Federation RF № 2015167 dated 23.12.1991. Shelf for skins drying. Suvankulov Sh.K., Abdugabiev Z.
[11] Popova N.V. With respect of properties of the structure of black Karakul sheep leather // Sheep breeding, 1966. № 4. - p. 21…23.