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DISCOLORATION OF SHEEP WOOL ON THE BASIC STAGES OF PROCESSING

ИЗМЕНЕНИЕ ЦВЕТА ОВЕЧЬЕЙ ШЕРСТИ ПО ОСНОВНЫМ ЭТАПАМ ПЕРЕРАБОТКИ

E.K. NARIBAYEVA, M.B. OTYNSHIYEV, V.Z. KRUCHENETSKY, K.K. ABILKALAMOVA
Э.К. НАРИБАЕВА, М.Б. ОТЫНШИЕВ, В.З. КРУЧЕНЕЦКИЙ, К.К. АБИЛКАЛАМОВА

(Almaty Technological University, Republic of Kazakhstan)
(Алматинский технологический университет, Республика Казахстан)
E-mail: kamilya.abilkalamova@mail.ru

The article shows results of measuring of sheep wool colour descriptions with the purpose of its sorting on natural colors. Applying the methods of prognostication by using of dynamic rows, investigated dependences of discoloration of wool on basic stages of processing.

В статье приводятся результаты измерений цветовых характеристик овечьей шерсти по этапам переработки с целью дальнейшей ее сортировки на естественные цвета. Применяя методы прогнозирования с использованием динамических рядов, исследуются зависимости изменения цвета шерсти по основным этапам переработки.

Keywords: coloured sheep wool, measuring of wool's colour descriptions, prognostication of change wool's colour on the processing stages.

Ключевые слова: цветная овечья шерсть, измерение цветовых характеристик шерсти, прогнозирование изменения цвета шерсти по этапам переработки.

Organic wool is becoming more and more popular. This wool is very limited in supply and much of it comes from New Zealand and Australia [1]. There are also naturally coloured, undyed wool from United Kingdom which processed by The Natural Fibre Company, in Launceston [4].

The wool sheep breeders have been selected for centuries to produce white wool, because white wool can be dyed any colour. The coloured genes in wool breeds therefore in time became rare, and are mostly present in recessive genes. The selection for coloured wool sheep is a long process [5].

It is known, a colour is one of the major indexes, which characterizes properties of objects that surround us in material world.

Textile fabrics from natural fibers have natural colours: yellow-gold for silk, warm yellow, black, different tones of grey and brown for wool, different tones of beige-grey for linen. Nowadays natural colours are very valued and one of the main constituents of ecological fashion. One of the ways of increase of sheep wool's competitiveness is to get more valuable products as wool on the basis of its dividing into clean natural colours [2].

The best-known end use for natural coloured wool is handcrafts. Spinners, weavers, felters and other woolcrafters value the wool from coloured sheep for its natural look and its freedom from dye chemicals [3].

In New Zealand coloured wool is also processed by commercial manufacturers into yarn, and may be made into woven or knitted garments, blankets and rugs, and other items [3].

Complication of getting clean natural colours of fibers are in difficultness of estimation of wool colour at its processing, because sorting produced in unwashed wool which has a thick enough layer of fat and dirt [1]. Also high heterogeneity in wool fibers colour in fleece and between fleeces causes the necessity of the special selection of workers for sort section and their training.

For industrial implementation of technology of sorting sheep wool on colours is necessary to develop system and sorting technology on colors, and standards of natural colours [2].

To get this aim the samples of existing natural colours of sheep wool of different breeds and regions were collected. For the exposure of quantitative descriptions of colour was used "clever" multifunction system of measuring surface's colour descriptions [6].

Estimation, comparison of colours and tints, their expressions are based on the use of methods of the objective measuring of colour by International colorimetric system. System based on the methods and principles which based on the three-component theory of colour sight, light sizes and properties of bodies, methods of presentation and formation of colours (analysis, synthesis), their combinations.

The instrumental system on the basis of colour touch-control was used for the objective estimation of the selected wool colour descriptions and further exception the variant identifying of wool colour.

The algorithm of decomposition and synthesis of colour descriptions of measureable wool colour includes determination for each of sample stake of the red, green, blue and white colours expected on measuring results and construction for each of these colours ground of minimum and maximum values.

All samples of the coloured wool in dirty, washed and after remove coarse fibers were measured and appraised. Every sample was measured 30 times. Such selection is objective because results of measurement are grouped around some average value, and their dependence is close to normal distribution. At the level of confidential probability 3δ 30 measurements were quite enough. The results of measuring of wool colour descriptions on the stages of processing are presented in a table 1.

Table 1

№ of sample	Colour	Types of wool			№ of sample	Colour	Types of wool		
		dirty wool	washed wool	removed wool			dirty wool	washed wool	removed wool
1	Red	328...389	299...358	322...346	7	Red	294...344	302...363	311...339
	Green	293...319	283...318	301...316		Green	265...324	289...333	296...320
	Blue	225...246	226...250	230...250		Blue	260...293	256...289	261...281
	White	29...46	43...57	57...65		White	12...16	12...15	14...16
2	Red	312...335	313...354	331...356	8	Red	324...361	326...349	324...344
	Green	291...325	295...320	301...318		Green	295...318	294...316	302...317
	Blue	249...271	257...271	235...248		Blue	241...262	240...257	238...250
	White	17...21	18...23	42...47		White	21...27	27...32	49...58
3	Red	325...359	307...362	318...342	9	Red	344...387	323...361	339...344
	Green	295...320	287...329	294...313		Green	294...317	293...314	298...313
	Blue	250...271	246...270	243...254		Blue	235...256	240...262	229...243
	White	17...20	17...28	30...36		White	17...25	22...31	47...57
4	Red	345...389	340...386	343...380	10	Red	308...347	303...336	298...334
	Green	286...319	289...317	286...321		Green	292...319	298...316	291...319
	Blue	233...256	238...263	239...266		Blue	251...275	259...279	17...21
	White	16...20	16...19	15...17		White	18...22	17...21	20...23
5	Red	280...360	297...327	291...308	11	Red	299...357	308...375	321...356
	Green	289...330	293...327	294...317		Green	279...323	287...330	293...312
	Blue	266...298	238...299	274...293		Blue	245...268	248...275	232...243
	White	10...11	10...11	10...11		White	16...22	13...25	45...50
6	Red	331...372	325...379	326...357	12	Red	308...350	291...336	314...334
	Green	289...318	290...326	295...318		Green	297...322	279...322	300...313
	Blue	245...267	252...278	258...278		Blue	241...257	300...313	236...250
	White	14...16	13...15	13...14		White	36...45	46...61	64...76

For the research dependence of wool discoloration on the basic stages of processing were used prognostication methods with the use of dynamic rows which allows to predict a numerical variable value on the basis of its past and real values.

Lines of a trend were made on experimental data of measurements. Trend (tendency) – basic tendency of row changing. For an analytical assessment of dependences of trend's line were used linear, exponential, square dependences. In the best way trend lines are described by square dependence.

All samples of wool were divided into 4 groups on the eventual colour of products after realization of roughing-out: melange, white, grey gamut and brown gamut. The distinguished colours and groups are presented in the table 2. The results of prognostication of wool discoloration on the stages of processing are presented in a table 3.

Table 2

№	Name of colour	Number of sample
1	Melange	not sorted or cannot be sorted on colours
2	White	1, 2
3	Grey gamut	
	Grey-beige	3
	Ash-coloured	10
	Mocco	7
4	Brown gamut	
	Cream	9
	Red	4
	Chestnut	6
	Dark brown	5

Table 3

Number of sample		Standard error	Number of sample		Standard error	Number of sample		Standard error
1	Red	0,12	5	Red	0,14	9	Red	0,49
	Green	0,53		Green	0,35		Green	0,94
	Blue	0,83		Blue	0,22		Blue	1,22
	White	0,74		White	403,28		White	0,59
2	Red	0,33	6	Red	0,21	10	Red	0,29
	Green	0,58		Green	0,45		Green	0,65
	Blue	0,60		Blue	0,64		Blue	1,03
	White	0,78		White	89,69		White	23,03
3	Red	0,24	7	Red	0,17	11	Red	0,13
	Green	0,43		Green	0,36		Green	0,28
	Blue	0,83		Blue	0,46		Blue	0,46
	White	2,12		White	36,9		White	0,66
4	Red	0,22	8	Red	0,49	12	Red	0,26
	Green	0,39		Green	0,94		Green	0,43
	Blue	0,60		Blue	1,22		Blue	0,12
	White	33,01		White	0,59		White	0,55

CONCLUSION

1. Use of "smart" system for an assessment of color characteristics of wool and their forecasting is expedient at express control of wool on sheep-breeding farms.

2. For an analytical assessment of dependences of trend's line were used linear, exponential, square dependences. In the best way trend lines are described by square dependence.

3. Samples (4, 5, 6, 7, 10) which have the homogeneous colouring of coarse, transitional fibers and fuzz showed an impermissible standard error for the stake of white colour constituent.

4. There is a need to develop the standards for natural colours of wool.

5. There is a need to develop method and laboratory equipment for the automated determination of unwashed wool colour, with the purpose of objective estimation colour descriptions of wool and further exception the variant identifying of wool colour by the workers of sorting workshop.

BIBLIOGRAPHY

1. *Jordan K. Speer.* Shearing the Edge of Innovation [Electronic resource]: Apparel Magazine. – Access mode: http://apparel.edgl.com/old-magazine/Shearing-the-Edge-of-Innovation64530 – (Date of appeal: 07.05.2016).

2. *Otynshiyev M.B., Naribayeva E.K., Abilkalamova K.K.* For the industrial sorting of wool by colours // Proceeding of International Scientific and Practical Conference: Innovative Development of Food, Light and Hospitality Industry. – Almaty, 2015, October 29...30. P.252…253.

3. Naturally coloured wool and its uses. Black and coloured sheep breeders' association of New Zealand [Electronic resource]. – Access mode: http://www.colouredsheep.org.nz/wool.php – (Date of appeal: 07.05.2016).

4. RBST. Rare breeds survival trust [Electronic resource]. – Access mode: http://www.rbst.org.uk/Marketplace/Wool – (Date of appeal: 07.05.2016).

5. *Dawie du Toit.* The Damara of Southern Africa. An essay on the genetic variation within the breed. [Electronic resource]: New Zealand rare breeds website. – Access mode: http://www.rarebreeds.co.nz/damara2.htm – (Date of appeal: 07.05.2016).

6. *Serikulova Zh.K., Vyazigin S.V., Kruchenetsky V.Z.* Wireless intellectual environment of measurement, transfer and processing of data of color characteristics of materials, products. // Proceeding of International Conference: Computational and informational Technologies in Science, Engineering and Education. – Almaty, 2015, September 24...27. P. 272.

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