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**A COMPARATIVE STUDY ON THE PHYSICAL AND CHEMICAL  
CHARACTERISTICS OF NORTHERN AND SOUTHERN INDIAN  
B. T. BUFFALO HIDES.**

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Received on February 24, 1977.

A systematic study on the leathers obtained with Indian buffalo hides collected from both northern and southern regions of the country is conducted with respect to their physical and chemical characteristics. The data obtained is statistically analysed and critically compared. The study will help in the selection of raw material for the production of leathers for particular end-use. It will also assist in the standardisation of production using the raw material obtained from either/both regions).

Water buffaloes are predominant and widely distributed throughout India. Two-thirds of the world population of buffaloes numbering more than hundred millions is found in India. Buffalo hides are tough besides being compact. They show, however, differences in fibre structure throughout their area. The fibres are loosely held in certain regions of the hide while they are denser with higher angle of weave in other regions. The magnitude and location of such variations in fibre structure are different with respect to different animals. Buffalo hides exhibit higher degree of such contrast in the fibre weave topographically as compared to other cattle hides and a detailed study on the variation of the properties with respect to location has been carried out.<sup>1</sup>

The leathers obtained from buffalo hides are put into varied uses in different parts

of the country. They can be selected for particular end-use depending on their specific characteristics. With the increasing awareness among the consumers to use products of best quality, there has been an obligation on the part of the industries in general, and those orienting themselves towards modernisation in particular, say in leathergoods industries, to produce quality products. As the quality of the final products is based on the quality of the components of such end-products, utmost care is to be taken to select the starting materials prior to the fabrication of the products out of them. The leather used in leather footwear, heavy industrial leathers such as belting leathers, picking bands etc. must have its requisite intrinsic properties so that they could impart such special characteristics to the products fabricated using them. The quality of the buffalo hides which are mainly used in the heavy

TABLE I

Physical characteristics of northern and southern Indian B.T. buffalo hides

Sl. No.	Charac- teristics	Neck				Back				Butt				Belly			
		North		South		North		South		North		South		North		South	
		A.M.	S.D.	A.M.	S.D.	A.M.	S.D.	A.M.	S.D.	A.M.	S.D.	A.M.	S.D.	A.M.	S.D.	A.M.	S.D.
1.	Tensile, strength, kg./sq.cm.	520.34	87.01	457.00	75.84	448.85	63.09	409.51	57.00	338.43	58.53	317.29	48.77	495.38	63.09	476.52	61.00
2.	Elongation at break, percent	39.91	5.89	42.62	5.61	41.14	6.50	43.63	6.24	41.55	6.51	42.36	5.99	39.76	5.73	41.74	7.35
3.	Apparent density	0.88	0.05	0.88	0.05	0.90	0.05	0.89	0.05	0.90	0.06	0.89	0.05	0.84	0.12	0.84	0.06
4.	Tongue tear strength, kg./cm. thickness	72.71	15.11	67.01	17.06	64.85	11.08	56.80	11.46	64.30	11.15	63.45	13.22	55.87	11.54	50.61	13.34
5.	Water absorp- tion, percent (Kubelka) $\frac{1}{2}$ hr.	46.42	5.40	54.07	6.00	44.87	4.95	46.42	5.38	45.27	7.05	46.54	5.93	61.84	6.29	62.23	8.27
6.	-do - 2 hrs.	48.68	7.27	55.85	6.56	47.23	5.25	49.24	5.50	47.60	6.74	49.47	6.48	63.49	6.80	65.23	8.37
7.	-do - 24 hrs.	53.77	5.59	62.44	7.03	51.66	5.47	53.77	5.59	52.35	6.95	53.11	7.02	72.71	8.48	70.86	9.16

A.M. = Arithmetic Mean  
S.D. = Standard Deviation

TABLE 2

Chemical characteristics of northern and southern Indian B T. buffalo hides

No. / S.	Charac- teristics	Neck		Back				Butt				Belly					
		North		South		North		South		North		South		North		South	
		A.M.	S.D.	A.M.	S.D.	A.M.	S.D.	A.M.	S.D.	A.M.	S.D.	A.M.	S.D.	A.M.	S.D.	A.M.	S.D.
1.	% Free oils and fats (petroleum ether solubles 40-60°C)	4.19	1.55	3.48	1.21	3.26	1.11	3.15	0.89	2.73	0.72	3.19	0.87	5.31	1.00	3.07	1.01
2.	% Water solubles	14.50	1.41	13.35	1.15	13.16	1.31	11.52	1.61	13.42	1.12	10.85	1.29	14.97	1.36	13.00	1.10
3.	% Insoluble ash	0.32	0.07	0.49	0.09	0.27	0.05	0.39	0.07	0.28	0.04	0.39	0.07	0.33	0.05	0.49	0.08
4.	% Hide substance	40.42	1.56	42.07	1.56	43.22	1.70	45.31	1.99	43.64	1.01	46.14	1.96	39.14	1.86	42.75	1.40
5.	% Fixed organic matter	25.84	1.12	26.39	1.10	26.00	1.21	25.54	1.41	25.94	1.25	25.57	1.24	25.72	1.29	26.00	1.48
6.	% Leather substance	66.26	1.83	68.67	1.84	69.21	1.38	70.93	1.99	69.58	1.96	71.72	1.68	64.86	1.94	68.75	1.92
7.	Degree of tannage	64.04	3.91	62.48	3.64	60.25	4.14	56.10	4.10	59.50	3.76	55.59	4.52	65.92	5.31	61.03	3.95
8.	pH of water solubles	3.73	0.14	4.01	0.12	3.68	0.14	4.02	0.13	3.72	0.15	4.05	0.12	3.78	0.13	4.04	0.12
9.	Difference figure	0.58	0.05	0.56	0.08	0.59	0.06	0.57	0.07	0.59	0.07	0.58	0.06	0.58	0.07	0.57	0.06
10.	% Total ash	1.39	0.21	1.58	0.22	1.20	0.17	1.52	0.22	1.16	0.09	1.26	0.17	1.65	0.18	1.62	0.21

Characteristics, 1-5 &amp; 10 are on 14% moisture basis.

A.M. = Arithmetic Mean

S.D. = Standard Deviation

leather industry in our country is a major factor to be reckoned with while selecting the raw material for processing towards particular end-use. In order to obtain correct information on the quality of Indian hides generally, and northern and southern Indian hides specifically, the present study is undertaken.

### Experimental

Buffalo hides from both the northern and southern regions of India, 36 hides from each region, are collected and vegetable tanned. The resultant leathers from both the regions are sampled into neck, back, butt and belly regions and subjected to physical testing and chemical analysis. The comparison of the result is made among the similar locations (neck region of northern hides—neck region of southern hides; back-back; butt-butt; belly-belly). The results are tabulated in Tables I and 2.

### Discussion

Even though the northern hides are found to possess greater strengths (tensile strength and tongue tear strength) than the southern hides, the variations among the hides are greater in the former than in the latter (greater standard deviation in northern hides). There is no perceptible difference with respect to apparent density among the two regions. Northern hides, however, record lesser percentage of water absorption thereby indicating greater resistance to water and greater compactness of fibre structure.

As regards the chemical characteristics, the percentages of non-leather substances viz. oils and fats and water solubles are generally greater in northern hides resulting

in lower percentages of hide substance. The tanning substance could be fixed to much greater extent in the northern hides. There is not much difference in the fixed organic matter, i.e. fixed tannins among the two regions. Leather substance is lower but degree of tannage is higher in northern hides consequent on lower hide substance. The extent of free acids-pH of water solubles and difference number is within the permissible limit in the leathers of both the regions.

### Conclusion

The hides from both the regions are found to produce leathers without much differences in their characteristics. The production of vegetable tanned leathers from Indian buffalo hides can, however, be standardised further by resorting to greater degree of fixation of loosely-held vegetable matter at the end of tanning in the case of northern hides and comparatively greater extent of oiling and rolling of leathers obtained with southern hides.

### Acknowledgement

One of the authors (GGR) is thankful to the Council of Scientific and Industrial Research, New Delhi, for the award of a fellowship to undertake the present work.

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