

LEATHER RESEARCH.

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Not the least of the many difficult problems facing the leather research worker is that of assessing quality of leather on a purely scientific basis, especially when sole leather is being considered.

Quality may be defined as the summation of certain properties which are appropriate to the special purpose in view. There are many different types of shoes for use under different conditions of wear, and it would seem to follow that there should be many different standards of quality of sole leather. An added difficulty is that each shoe-manufacturer desires certain properties in the leather to suit his methods of building the shoe, which may not necessarily be those required by another firm, nor may they be related to the demands of the ultimate consumer.

What is quality in sole leather from the wearer's point of view ? The average person requires that sole leather shall keep his feet dry in wet weather and have a reasonable wearing-life. Some people, however, may demand lightness and flexibility without giving any consideration to water-proofness and wear. The question now arises, Is it possible with present methods of leather-manufacture to combine the properties of resistance to water and wear with those of lightness and flexibility ? Putting the question in another form, Is a person who has bought shoes with light flexible soles justified in complaining if the soles do not give reasonable wear and resistance to water in ordinary wet wear ?

The demand for thin, light sole leather has compelled the tanner to use thin hides. These may be from immature animals or from those of a type recognized as not giving leather of high wearing value. In other words, the tanner is being compelled to turn out a product in which, in order to obtain certain desirable features, one of its essential properties is to some extent sacrificed.

Sole leather may be considered as consisting of leather fibres and a class of materials known as "water-solubles." During the year under review an effort has been made to determine some of the functions of water-solubles in sole leather in relation to resistance to water-absorption and wear. The results obtained, and summarized below, show that resistance to wear and water-absorption do not go hand in hand with flexibility. The average person knowingly buying shoes with light, flexible soles is therefore not justified in complaining if the soles do not wear well and do not resist the penetration of water.

Many people believe that shoes wear better after they have been resoled. This is probably the case, and will continue to be so as long as the sale of shoes with very light, flexible soles continues. On the other hand, many people complain of the thicker soles placed on the shoes by the shoe-repairer. It is evident that the wearer must choose which property he desires and be prepared to accept the result of that choice.

In past years there have been many attempts to correlate certain chemical properties of leather with quality. The standards of quality, however, were arbitrarily fixed without a direct relation to the properties of leather as determined under actual wearing-conditions. Although the method is somewhat tedious, actual wear tests were used to obtain the results which are given below.

FUNCTIONS OF WATER-SOLUBLES IN SOLE LEATHER.

Generally speaking, it may be said that increasing the amount of water-solubles tends to make the leather less flexible. Specific effects are as follows :—

Insole Leather.

Increasing the amount of water-solubles in insole leather—

- (1) Decreases the porosity and thus tends to reduce the rate of removal of the products of perspiration from the foot :
- (2) Increases the amount of perspiration produced by the foot—*i.e.*, decreases the shoe comfort :
- (3) Increases the tendency for the hose to become discoloured :
- (4) Causes the leather to retain the products of perspiration longer, thus causing more rapid deterioration of the leather, as shown by the formation of cracks.

Insole leather should therefore contain as little water-solubles as possible, provided that due consideration is given to the fact that it is the foundation of the shoe, and as such requires a certain amount of rigidity.

Sole Leather.

(a) *Wearing-value.*—Increasing the amount of water solubles in sole leather increases the wearing-value when worn under alternate wet and dry conditions. For perfectly dry wear increasing the water-solubles decreases the wearing-value.

(b) *Resistance to Water-absorption.*—Increasing the amount of water-solubles increases the resistance to water-absorption. Water-solubles are washed out during wet wear, and it is important that they should be retained as long as possible. It was found that this was the case when the leather was less flexible, especially when wet.

The results obtained by research become of value to an industry when by their application they help to improve the quality of the finished product, increase the efficiency of manufacture, and help to solve the many problems which arise in the factory. During the year this sphere of the activities of the Research Association has been fully maintained. As in previous years, investigations of immediate factory problems have always taken precedence over the programme of research being carried out. This has involved the examination and testing of hides, tanning materials, tanning liquors, finished material, and processes of manufacture.