

NOTES ON THE ORIGIN AND SIGNIFICANCE OF THE PEROXIDE VALUE OF ANHYDROUS LANOLIN

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Wool fat on the fleece has a high peroxide value because of autoxidation, this value falls greatly during washing of the wool and grease-recovery as a result of biological or chemical reduction. It increases again if anhydrous lanolin refined from this grease is bleached by oxidation. Peroxide values are useful as a measure of autoxidation only if values of the surface and lower layers are compared.

ANHYDROUS lanolin (referred to hereafter as "lanolin") when newly-refined and before oxidative bleaching processes, is invariably of low peroxide value as is also the crude wool fat from which lanolin is refined. But ample evidence has been published (Lifschutz, 1924; Drummond and Baker, 1929; Freney, 1940; Gillam, 1948) of the extensive oxidation of wool fat on the fleece and which would be expected, therefore, to have a high peroxide value. No peroxide values of such wool fat have been published therefore we have investigated the apparent anomaly.

EXPERIMENTAL

Three types of wool, between 1 and 2 years old, were treated with hot diethyl ether to extract most of the wool fat, the ethereal solutions being filtered and evaporated to dryness on a water bath as quickly as possible under a stream of nitrogen. Whilst these wools were being washed at the woolcombing factory, and the grease recovered by the normal centrifugal processes, further samples of fat were obtained at different stages of the processing, in one instance the sampled scouring liquor, after being allowed to stand for 24 hr. at room temperature, was then boiled for 1 hr. before extracting further quantities of fat with ether.

Peroxide values of all the wool fat samples were determined using the simplified Lea (1938) method and expressing results as ml. of 0.002N thiosulphate per g. of sample.

RESULTS

The results are given in Table I.

TABLE I
PEROXIDE VALUES OF ALL WOOL FAT SAMPLES

Sample	Peroxide value
Fat from 66-70 ⁸ wool	46.5
Fat from 64 ^B Australian wool	73.5
Fat from 74 ⁹ Australian wool	49.5
Average of the 3 wools	56.5
Fat from wash-bowl liquor	15.5
Fat from liquor after standing 24 hr.	12.0
Fat from liquor after boiling 1 hr.	5.7
Crude wool grease from centrifuges	3.5

DISCUSSION

The results show that the wool fat on the fleece had a high peroxide value, but that when the fat was emulsified in the scouring liquor (containing soap and sodium carbonate) the value rapidly fell, reaching a very low level in the grease recovered from the centrifuges. It seems probable that there was a reduction of the peroxides by chemical or biological reducing agents from the wool and activated by conditions in the emulsion. Under the relatively anhydrous conditions on the fleece these agents were presumably inactive or their effect out-paced by aerial oxidation.

Unbleached lanolins produced from centrifugally-recovered wool fat have been found to have peroxide values between 1 and 12 depending on processing methods. A higher peroxide value of lanolin, however, is not indicative of autoxidation unless the peroxide value of the surface is significantly higher than that of the underlying bulk, since autoxidation of lanolin during storage affects only a thin surface layer (Clark and Kitchen, 1961). A high peroxide value for the whole of lanolin is a normal result of oxidative bleaching processes which are used because of the call for lanolin of the palest possible colour. A peroxide value produced in this way is not accompanied by the large changes in acidity, unsaponifiables and cholesterol content which accompany a similar peroxide value resulting from gradual autoxidation. Odour improves rather than deteriorates during bleaching, confirming that the odour of highly autoxidised lanolin is not directly attributable to peroxides but to their breakdown products. Our results suggest that these develop no more rapidly in a bleached lanolin than in one of low original peroxide value.

That a high peroxide value in bleached lanolin is no detriment to its general application is made obvious by the preference which has always been shown for such lanolins by users. Only recently has an isolated disadvantage been reported, here batches of penicillin ointment prepared from lanolin of high peroxide value were found to have poor shelf life (Diding and Sandell, 1949).

Thus, the recent tendency to regard lanolin as being autoxidised or rancid because of a high peroxide value is based upon an unsound comparison with other fats and oils. If the specification of a maximum limit for peroxide value should be contemplated, it should logically only be considered for special circumstances which arise such as that of penicillin ointment.

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