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THE DEVELOPMENT OF SHEEP BRANDING FLUIDS REMOVABLE BY SCOURING

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Summary

Experiments have been undertaken to devise a branding fluid which will remain on sheep for a year and then be removed during the normal wool-scouring process. Satisfactory products have been developed using pigmented aqueous emulsions of lanolin, rosin, and stearic acid with ammonium stearate as emulsifying agent. The importance of the type of pigment used and effects of variations in the proportions of ammonia, rosin, and stearic acid are discussed.

I. INTRODUCTION

One of the major problems of the wool industry results from the use of sheep-branding fluids which resist commercial scouring. The expense and inconvenience involved in removing such contamination from the wool, through extra sorting and special processing, is a source of frequent complaint by manufacturers, and there is urgent need for a branding fluid which will be removed during scouring.

Previous work on the subject (King and Smith 1926; Matetskii and Raikhlim 1940) has been limited as it is difficult to devise a branding fluid which will remain on sheep exposed to all conditions of weather for a year and then scour out in soap solution. The present paper describes experiments, carried out during 1943-45, leading to the formulation of a product which has been found to comply with the above requirements. It is not claimed that the final preparation is the best that can be devised (on some occasions it has not scoured out completely), but its adoption should largely overcome the branding problem. The work is described at the present stage of the investigation so that the findings may be used by manufacturers of branding fluids.

II. GENERAL OUTLINE OF EXPERIMENTS

A total of 153 preparations was compounded in the course of the investigation and, after laboratory tests, the more promising of these were subjected to field trials.

In developing the new fluids, it seemed logical to use lanolin as a major constituent, as this product satisfies the required conditions of adherence to the fleece during growth and removal during scouring. Previous workers (King and Smith 1926; Matetskii and Raikhlim 1940) have also realized this. Therefore experiments were carried out using pigmented aqueous emulsions of lanolin containing volatile emulsifying agents, such as

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ammonium soaps, which would decompose when exposed on sheep and so ensure that the brand could not be subsequently emulsified and washed out by rain. Pigmented emulsions of lanolin were considered preferable to pigmented solutions in organic solvents firstly, because it was found that they gave much brighter coloured products on the sheep, and secondly, because they were cheaper.

III. METHOD OF TESTING IN THE LABORATORY

The first tests for weather resistance consisted in applying fluids to sheepskins which were then allowed to remain exposed on the roof of a building and periodically examined (Plate 1, Fig. 1). As progress was slow by this method, the following accelerated technique was adopted. The brand was applied to a 6 in. square of sheepskin attached to a board and placed in an inclined position under a fine spray of water; the spray could be varied as required to simulate different rates of rainfall. It was then placed overnight in a hot-box maintained at 95-100°F. Both treatments were alternated as often as required and in this way, accelerated tests were obtained. It was fully appreciated, however, that the ultimate and most reliable test was that carried out in the field.

The effect of scouring on each preparation was observed by washing the clipped wool in a solution containing 0.2 per cent. soap and 0.1 per cent. soda ash at 40-50°C. and squeezing through hand-wringers.

IV. DEVELOPMENT OF A SATISFACTORY FLUID

The earlier fluids consisted of lanolin emulsified with ammonium stearate to which was added a pigment such as iron oxide. As these preparations lacked weather resistance, some rosin was next incorporated in the formula to improve adherence to the fleece.

After about 40 fluids had been prepared, it appeared that some were worth testing in the field, so practical trials were initiated during the 1943 shearing season. Of the four fluids tested, three had the same emulsion formula but contained different pigments, whilst the fourth contained less water than the others.

The method of preparation was as follows:

Lanolin (400 g.), stearic acid (200 g.), and rosin (90 g.) were melted and added with mixing to ammonia (25 cc.; sp. gr. 0.88) in water (375 cc.); the pigment (300 g.) was next mixed into the thick paste followed by 2330 cc. of water. (2000 cc. for preparation No. 40). The pigments used were as follows:

Fluid No.	Pigment
36	Vermilion
39	Ultramarine blue
40	Drop black
41	Iron oxide

Of these fluids, which were tested under different conditions, No. 41 remained satisfactorily on the sheep for a year and was removed during laboratory scouring. The reports received on the other preparations showed that they had not resisted weather conditions, losing much of their legibility on exposure. These tests, therefore, showed that the pigment used had an important bearing on the performance of the branding fluid. Ultramarine blue became dull very quickly and was readily washed out of the fleece by water. Iron oxide, on the other hand, displayed satisfactory resistance to weathering. Other pigments were therefore tested, including tropic red, bright red, red lead, carbon black, "Monolite Fast Scarlet RBS.", and "Monolite Fast Red BS." Of these, the last two pigments gave the most stable and brightest products.

Laboratory tests at this stage also showed that the durability could be enhanced by increasing the rosin content. Experiments were therefore conducted with branding fluids in which portion of the stearic acid was replaced with rosin. It was found that a lanolin : stearic acid : rosin ratio of 40 : 18 : 11 was better than the earlier ratio of 40 : 20 : 9, and later, the rosin content was increased even more at the expense of stearic acid. Reduction in the content of stearic acid also reduced the viscosity of the fluid. The viscosity of the fluids was found to decrease by increasing the proportion of ammonia. At pH values above 9.5, however, there was a tendency for a lower aqueous layer to separate and so all fluids were based on emulsions within the pH range 8.9 to 9.5.

For all subsequent fluids the method of preparation was considerably simplified. The lanolin, rosin, and stearic acid were melted and heated to about 110°C. and then added slowly to all the water containing the ammonia, preferably with mechanical stirring. In this way, very stable emulsions were quickly prepared. The required quantity of pigment was then mixed into the emulsion using a ball-mill.

V. Large Scale Trials

The fluids listed in Table 1 were prepared for field trials mainly in Queensland and New South Wales. Quantities given do not always represent the actual amounts involved, but the compositions are so expressed for convenience in comparison.

In Fluid No. 130, some of the lanolin was replaced by tallow, and some oil of *Eucalyptus phellandra* was also added as a preservative.

In general, the weather-resistance of these fluids was satisfactory and, except for the yellow, green, and one of the black fluids, (No. 80), the results were equal to and often better than those of the usual station brands.

Fluid No. 66A, the first to be tested, performed well in the field during a year's exposure and was satisfactorily removed when the branded wool was scoured in the laboratory. The appearance of sheep at the beginning and end of a trial using Fluid Nos. 76, 77, 88, 93, 110, 111, and 112 is

shown in Plate 1, Figure 2, and Plate 2, Figure 2, respectively, whilst Plate 2, Figure 1 shows a sheep from the same group after dipping, 2 days after branding. During this trial the rainfall registration, including snow, was 13 inches. The opinion of the station manager was that the brands were satisfactory and that the blue was the first he had encountered that would resist weathering. After shearing, the wool (about 650 lb.) was commercially scoured, and, despite the unusually heavy marking of each fleece, all brands scoured out completely.

Table 1

Composition of Branding Fluids

Fluid No.	Lanolin (g.)	Stearic Acid (g.)	Rosin (g.)	Ammonia† (cc.)	Water (cc.)	Pigment	Concentration
62	400	180	110	70	2400	"Monolite Scarlet RBS"	30.0
66A	400	100	200	70	2400	"Monolite Scarlet RBS"	28.5
76	400	100	200	70	1200	"Monolite Scarlet RBS"	28.5
77	400	150	150	70	2400	"Monolite Scarlet RBS"	28.5
80	400	150	150	70	2400	Drop black	200
81	400	150	150	70	2400	"Monolite Red BS"	27.5
82	400	150	150	70	2400	Midchrome yellow	27.5
83	400	150	150	70	2400	"Monolite green"	27.5
88	400	100	200	70	2400	"Monolite Scarlet RBS"	27.8
93	400	100	200	70	2400	Lacquer black	28.8
110	425	75	200	30	2400	"Monolite Red BS"	25.0
111	425	75	200	30	2400	"Monolite Scarlet RBS"	25.0
112	425	75	200	30	2400	"Monastral Blue BS" weak	21.7
127	425	75	200	33	2400	"Monolite Scarlet RBS" "Monolite Red BS"	20.8 4.2
130*	368	100	140	40	2400	"Monolite Scarlet RNS" "Monolite Scarlet RNS" 50% lake	18.8 18.8

* Contained in addition 57 g. tallow and 14 cc. oil of *Eucalyptus phellandra*.

† Sp. gr. 0.88.

In another test involving Fluid No. 77 it was again reported that the results were satisfactory. Some of the branded wool was collected after shearing and scoured commercially; only a small amount of the brand remained on the wool after scouring.

Plate 2, Figure 3 shows sheep branded with Fluid No. 111 9 months after application. This brand was removed on subsequent scouring.

Fluid No. 62, which contained the highest proportion of stearic acid, was not readily removed by scouring. This observation indicates that, for best results in scouring, it is important not to use too much stearic acid in the fluid.

Fluid No. 130 was tested extensively in the field and, with few exceptions, results were very satisfactory; through unforeseen circumstances, large-scale scouring trials were not carried out on the branded wool.

VI. Conclusion

The foregoing experiments show that satisfactory sheep-branding fluids can be prepared from lanolin, rosin, and stearic acid emulsified in water with ammonium stearate. Preparations with a lanolin : rosin : stearic acid ratio of 4 : 2 : 1 have performed well, both in the field and during subsequent scouring of the wool. A higher proportion of stearic acid makes the fluid too viscous and can impair the subsequent scouring properties. The type of pigment used has an important bearing on performance in the field; of those used, "Monolite Scarlet," "Monastral Blue," and a lacquer black gave the best results.

VII. Acknowledgments

Appreciation is expressed for the ready provision of all facilities by the Central Wool Committee, in whose laboratories the research was undertaken. In particular, the author is indebted to Mr. J. R. McGregor for his constant encouragement throughout the work. Mr. D. T. Boyd, Chairman, Australian Wool Board, is thanked for his helpful interest in the work at all stages. The author's thanks are also due to Mr. M. R. Freney for constructive criticism in many phases of the work. Mr. C. Eyre, of Glolac Ltd., Sydney, helpfully collaborated in the large-scale mixing of fluids. In the field trials, assistance was readily given by many graziers, and, in particular, Mr. Euston Young, of Noondoo, Queensland, and Mr. Bruce Monckton, of Dalgety, New South Wales, are sincerely thanked for their hospitality and collaboration. Mr. N. P. H. Graham also rendered valuable help with field observations on several of the fluids. Appreciation is also expressed to the managements of Whiddon Pty. Ltd., and Botany Wools Pty. Ltd., Sydney, for their cooperation in the scouring trials.

VIII. References

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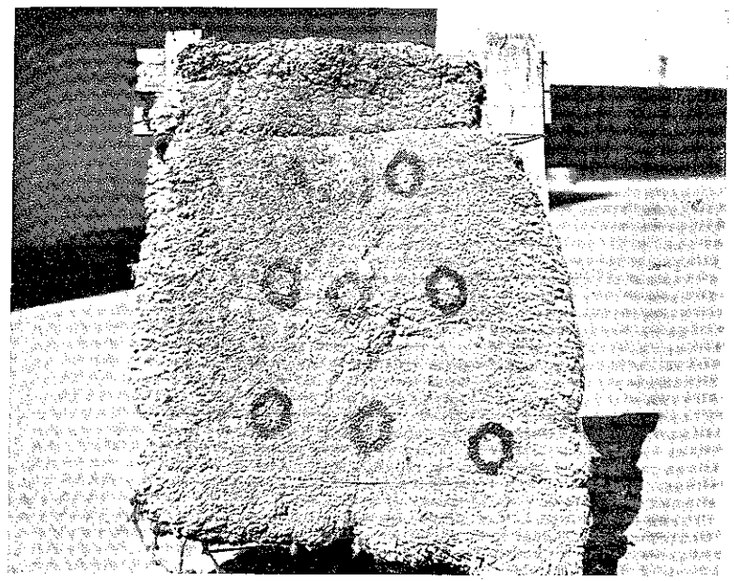

Fig. 1.—Exposure tests on sheepskin.

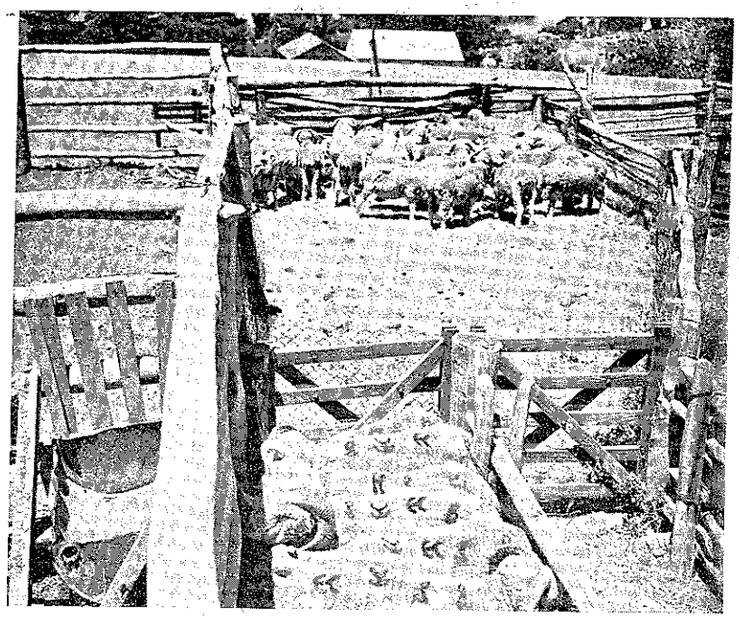

Fig. 2.—Immediately after branding, Dalgety, N.S.W.

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Fig. 1.—After dipping, Dalgety, N.S.W.

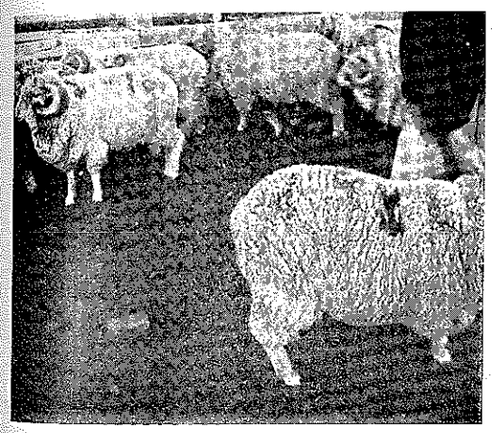

Fig. 2.—After a year's exposure, Dalgety, N.S.W.

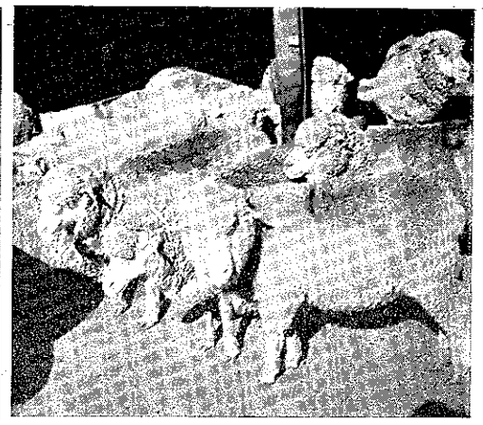

Fig. 3.—Preparation No. 111 after 9 months' exposure.