

Influence of Regular Dipping on the Merino Sheep and its Fleece.

By PROFESSOR J. E. DUERDEN, M.Sc., Ph.D., Director of Wool
Research;

G. S. MARÉ, B.Sc.(Agric.), Sheep and Wool Research Officer,
Grootfontein; and

V. BOSMAN, M.Sc., Sheep and Wool Research Officer, Groot-
fontein.

INTRODUCTION.

A MERINO sheep dipping experiment has been concluded at the Bathurst Experiment Farm. The latter is a sub-station of the Grootfontein School of Agriculture and is maintained for the purpose of investigating the many peculiar problems associated with the coastal areas as distinct from the Karroo. The Experiment Station is five miles inland at an altitude of 1,100 feet above sea-level. The rainfall is from 25-30 inches per annum and is distributed fairly evenly over the twelve months. The soil is sandy and the pasture is typical grass veld, *Digitaria* and *Themeda* species predominating.

Scattered bushes occur on the farm and part of it is overgrown with dense bush.

It is situated in a tick-infested region, where Merino sheep are farmed with difficulty on account of the prevalence of heartwater, the infection being carried by the bont tick (*Amblyomma hebraeum*).

The Bathurst district, like the rest of the coastal areas, is eminently suited for wool production and is known to grow wool of high quality which is much favoured by the trade. It has been asserted by older inhabitants that large flocks of Merino sheep flourished in the district before the advent of the tick and heartwater.

In their report "A Survey of Sheep Farming Conditions in the South-East Coastal Districts of the Cape," Warren, Maré and Roux (1928) mention that "The carrying capacity in the Bathurst district is about three sheep per morgen, though improved farms are said to carry five," and that "approximately 93 per cent. of losses among

European-owned sheep are due to disease; heartwater losses are most serious while blue tongue accounts for a relatively small percentage." Also that "heartwater is the most important problem which the sheep industry of the coastal belt is up against," and that "the most successful methods of combating the disease are the control measures advocated by the Veterinary Department, Pretoria." In these, weekly or fortnightly dipping of stock is recommended for the ultimate eradication of the tick. It is therefore evident that successful stock farming can only be maintained in the heartwater areas following upon tick elimination.

Until recently it was not considered advisable to dip Merino sheep carrying more than three to four months' wool growth. In its report "The Effect of Various Dips on Wool," the Department of Agriculture (1926) have recommended "that the sooner the dipping can be carried out after shearing, the less effect the dip is likely to have upon the wool." This means that successful introduction of Merinos into tick-infested areas would probably entail a regular weekly or fortnightly dipping for twelve months, which procedure seemed contrary to practice.

In order to ascertain whether the Merino could withstand regular dipping as that required for tick control, the above experiment was initiated.

PROBLEMS TO BE INVESTIGATED.

It was customary for farmers to make use of scrub cattle and non-woolled sheep for cleaning their farms of ticks. This type of stock was dipped either weekly or fortnightly without any harmful effects on the animal and its coat such as was expected with woolled sheep. In the case of Merinos no experimental data was available to show how such regular dipping would influence the animal and its fleece.

The present experiment was planned to conform as nearly as possible with the conditions and methods of dipping that were in vogue in the Bathurst district. The dip mostly in use was arsenite of soda; the strength of the solution varying according to whether seven-day or fortnightly dipping is followed.

In this experiment the sheep were to be subjected to regular seven-day dipping; the object in view was to establish, whether the Merino sheep could withstand and adapt itself to dipping at regular intervals if introduced into tick-infested areas, where regular dipping of stock is essential, and what effect such dipping would have on the fleece.

PLAN OF EXPERIMENT.

Ninety Merino lambs were used. Half of these were of the plain-bodied, long loose wool type, while half were of the wrinkly, short, dense wool type. The former were selected at the Grootfontein School of Agriculture, while the latter came from Queenstown. The object of having two distinct types was to ascertain whether there was any differential response between the types.

The 45 plain-bodied animals were divided into three groups of 15 each; the first group was dipped weekly in a solution of arsenite of soda of strength 2 lb. per 100 gallons water; the second were immersed weekly in water only, and these served as dipping controls; while the third lot were not dipped and served as general controls. A similar division and treatment was adopted with the 45 wrinkly animals.

There were thus 30 sheep which received a weekly dipping in arsenite of soda; 30 that were dipped in water; and 30 were not dipped. First dipping was applied on the 22nd January, 1930, three weeks after shearing.

The sheep were run in one flock on the Bathurst Experiment Station for the whole of the period of treatment. They received no extra feed except a lick, which consisted of: salt, bone-meal, sulphur and tobacco. Monthly dosing for gastrointestinal parasites was practised.

Two dipping tanks were used: one for water and one for arsenite of soda solution. The latter was tested and brought to the required strength before each dipping. All dipped animals received similar treatment as regards handling, and the immersion of each animal was timed for two minutes. The usual dipping precautions were observed such as: rain, extreme heat, driving before and after immersion, etc. On account of rain the animals were dipped only 39 times during the twelve months. In Table 1 the monthly rainfall is given as well as the number of dippings the animals were subjected to.

TABLE 1.

Month.	Rainfall in Inches.	No. of Dippings.
January.....	1.72	2
February.....	2.46	4
March.....	5.05	2
April.....	1.04	4
May.....	0.90	5
June.....	2.56	2
July.....	0.85	5
August.....	2.44	2
September.....	2.04	3
October.....	5.71	3
November.....	0.81	3
December.....	2.48	3
January.....	2.10	1

The condition of each sheep was recorded by monthly weighings, after the usual starvation period of 14-16 hours. Monthly observations were made on the occurrence of ticks. Wool samples were clipped on shoulder regions every month for laboratory analysis. All sheep were shorn at the end of twelve months and fleece weights recorded.

The wools were submitted for examination to wool buyers at Port Elizabeth and then sent to the British Wool Industries Research Association at Torridon, Leeds, for analysis and report.

INFLUENCE OF REGULAR DIPPING ON MERINO SHEEP.

TABLE 2.—Group Live Weight Average in Pounds.

Group.	Treatment.	Initial Shorn Weight 1930.	First Three Months.	Second Three Months.	Third Three Months.	Fourth Three Months.	Sheep Weight with Fleece 1931.	Fleece Weight.	Final Shorn Weight.	Percentage Increase of Body Weight.
A1*	Dipped in Ars. of Soda.....	90.4	92.5	88.5	89.8	98.4	97.6	10.4	87.2	Not significant.
B1†	Dipped in Ars. of Soda.....	72.0	80.7	83.9	86.4	96.4	96.1	10.9	85.2	18.3
A2*	Dipped in Water.....	89.4	93.1	87.6	89.3	95.8	96.1	8.9	87.2	Not significant.
B2†	Dipped in Water.....	74.2	81.6	88.5	86.6	96.3	96.2	10.4	85.8	15.6
A3*	Not Dipped.....	91.5	94.7	89.2	91.5	93.7	95.8	9.3	86.5	Not significant.
B3†	Not Dipped.....	70.8	80.9	84.8	87.6	94.7	95.1	11.8	83.3	17.7
A1 + B1	Dipped in Ars. of Soda.....	81.2	86.6	86.2	98.1	94.1	96.9	10.6	86.3	Not significant.
A2 + B2	Dipped in Water.....	81.8	87.4	85.6	87.9	96.1	96.2	9.7	86.5	" "
A3 + B3	Not Dipped.....	81.2	87.9	86.5	89.6	95.9	95.5	10.6	84.9	" "

* A1, A2, and A3 plain bodied, long loose woolled type.
 † B1, B2 and B3 wrinkly bodied short dense woolled type.

EXPERIMENTAL RECORDS AND RESULTS.**A.—CONDITION OF THE SHEEP.**

Sheep weights varied somewhat during the course of the year, according to the feeding value of the veld. The 45 plain body sheep were in good condition at the commencement of the experiment, and the shorn weight in all groups at the end was not significantly different from that at the beginning. The wrinkly sheep on the other hand were in low condition at the beginning, and after a year showed an increase of fifteen to eighteen per cent. over the initial weights. At the conclusion, the three differentially treated groups, i.e. the arsenite dipped, water dipped and not dipped showed no significant difference over the initial weights.

In Table 2 are given the average three-monthly weights of the groups throughout the year; also the weight of the fleece in the greasy state, and the shorn weight of the group at the end of the period of treatment. Comparisons of the latter are made in the last column of the table, which establish that the sheep have not suffered adversely in condition after a year's weekly dipping when compared with the undipped animals.

B.—MORTALITY.

As regards mortality it is of significance that all the sheep dipped weekly in arsenite of soda survived. Of the thirty water-dipped controls, three died, while five deaths occurred among the thirty undipped controls, one of which was from heartwater. It must be observed that though the Bathurst Experiment Farm is situated in a tick-infested area, and that heartwater is prevalent, ticks have been largely eliminated from the farm, otherwise the mortality in the controls from heartwater would doubtless have been greater. This, however, in no way detracts from the value of the experiment, which was designed only to ascertain if Merino sheep could withstand weekly dipping while producing a full year's wool growth. A few odd ticks were found on the undipped and water-dipped controls, but none occurred on the arsenite dipped sheep. The latter were also free from blowfly trouble, whereas the controls were frequently struck.

Summarising, we may say that the experiment has proved that, under conditions similar to those prevailing at Bathurst, Merino sheep can be dipped weekly in the seven-day solution of arsenite of soda over a period of twelve months without any harmful effects to the animals.

C.—FLEECE.

It has been shown above that the dipping had no marked effect on the condition of the sheep, but as regards the fleece, differences have been established in some of the characteristics.

(a) Weights.

In Table 2 are given the fleece weights as shown in the greasy state. There is no significant change between dipped and undipped fleeces. Small differences that do occur may be due to incidentals of the greasy weights.

(b) *Fibre Fineness.*

As regards fibre fineness and quality of the wools in the different groups, measurements show no significant difference among the groups. In Table 3 are given mean fibre thickness and quality number.

TABLE 3.
Fibre Thickness.

Lot.	Mean Thickness. 1929.	Quality Number.	Treatment.	Mean Thickness. 1930.	Quality Number.
A	19.39 μ	66's	Dipped Ars. Soda...	19.90 μ	66's
B	19.54 μ	66's	Dipped Water.....	20.00 μ	66's
C	20.45 μ	64's	Not Dipped.....	20.49 μ	64's

In the above table comparative wool measurements are given for two successive seasons. The 1929 growth was produced at Grootfontein and Queenstown respectively, and the 1930 shearing at Bathurst.

A slight thickening of fibres is observed in the Bathurst grown wool, but this is consistent for all three groups.

There has therefore been no significant change in fibre thickness due to dipping; in fact, the quality numbers of the wools remained constant.

(c) *Staple Length.*

Staple lengths of 1929 and 1930 shearings are given in Table 4. There is no significant difference in the groups due to experimental treatment.

TABLE 4.

Lot.	Mean Length. 1929.	Treatment.	Mean Length. 1930.
A	6.3	Dipped in Ars. Soda.....	6.7
B	6.3	Dipped in Water.....	6.5
C	6.2	Not Dipped.....	6.7

(d) *Coloration.*

As regards coloration the wool from the dipped sheep presents a very different appearance from that of the undipped. The stapling is partly lost and for the most part the wool is harsh, inelastic to the feel, and unattractive in appearance. The foreign matter, consisting of sand and dirt, also extends more or less throughout the length of the staple, instead of being restricted to near the tip. The

distribution gives a dull, dark appearance to the whole fleece, very different from the light, bright character of the undipped wool. Little or no difference however can be discovered when comparing the wool from the arsenite dipped sheep with that of the water dipped controls. Hence it can be assumed that deterioration was due to the water of the dip and not to the arsenite of soda.

A closer examination of the wool indicates the nature of the changes which have taken place. Mixed with the yolk of all wools is the substance known as suint. This is the dried perspiration of the sheep and is secreted by the sweat glands, while the grease proper is the waxy substance secreted by the fat glands. The suint is soluble in water, while the grease is not. It is manifest that by dipping the sheep in water the suint has been dissolved, and this has also affected the general distribution of the yolk. The water has penetrated the whole thickness of the fleece and either washed away the suint and yolk or transferred the particles of dirt with it, as well as any sediment from the dip. On the drying-up of the water in the sun, any yolk and suint would be re-deposited among the fibres, and the dirt particles along with them, producing a general discoloration and dullness. The natural arrangement of the staples is also partly disturbed, and the crimping somewhat obscured.

The arrangement of the individual fibres of the staples has not been markedly altered; they appear more closely bound together than usual, the "springy" feel and "life" of the wool being lost.

(c) *Deterioration and Values.*

In addition to the observations made in the research laboratory on the fleeces, these were submitted to experienced Wool Buyers and Brokers at Port Elizabeth for examination. It was admitted by them that they were not familiar with dipped wools as those presented, and consequently were somewhat reticent in being definite on merits and demerits of the dipped lots; although they were not in a position to value the wools with assurance there seemed a general agreement on the following:—

- (a) That the dipped wools will require heavier scouring.
- (b) That tops from the arsenite dipped wool will be either yellowish in colour or dingy in appearance.
- (c) That the matting will affect the tare.
- (d) That the clean yield will be higher for the arsenite and water dipped wools, than for the corresponding natural grease wools.
- (e) a slight harshness in both arsenite and water dipped wools was admitted.
- (f) A musty smell in the arsenite dipped wool was apparent, whereas the water-dipped wool retained the typical "sheepy" smell.

The Report by the British Wool Industries Research Association is appended in full and gives comments on the wools from the manufacturer's point of view.

ADDENDUM.

A.—REPORT BY THE BRITISH WOOL INDUSTRIES RESEARCH ASSOCIATION, TORRIDON, LEEDS.

In accordance with the instructions forwarded after packing, two bales of wool arrived, consisting of:—

Lot A.—Fleeces from sheep dipped weekly in a solution of sodium arsenite.

Lot B.—Fleeces from sheep dipped weekly in plain water.

Lot C.—Fleeces from sheep undipped (controls).

These wools were examined in the greasy state at the mills of the Preston Street Combing Co., Bradford, by members of the British Wool Federation.

The experts were of the opinion that Lots A and B had lost considerably in appearance and handle. The appearance of A was probably better than that of B. Both A and B were inclined to be tender near the bottom of the staple. C was regarded as a good class of wool.

The order of excellence of the above lots was given as C, A, B.

It was decided that no further opinion could be given until the wools had been scoured and combed, and Messrs. John Smith & Sons kindly undertook to put the wool through these processes, and rendered the following report on the 23rd November, 1932:—

“ With reference to the three samples of South African wool which have been treated by a special sheep dip, we have arranged to have a top and a sample of noil from each lot to be forwarded to you to-morrow by road.

“ The following tables show the combing results for each lot:—

Lot.		Weight.	Tear.	Yield.
C	Untreated Wool.....	lb. 115	11.66	% 33
A	Arsenite Dip.....	197	13.93 to 1	42.6
B	Water Dip.....	140	10.2 to 1	40

“ In the above results the yield given is that of top and noil only, no allowance having been made for waste, etc. On account of the small weights of wool put through, not too much attention should be paid to these results. Difference in tear might just as easily be due to variations in the actual fleeces rather than to the effects of the dipping.

“ Examination of the tops, however, shows a very marked difference; while Lot C may be classed as a 70's super 10-12 months' Cape of average strength, Lot A appears slightly longer and stronger in fibre, but, at the same time, rather low in quality. The general appearance seems to indicate that being slightly stronger, the longer fibres have not been broken quite so much as in Lot C. The additional strength, however, may be due to lower quality rather than to the effects of dipping.

“ Compared with Lot C, Lot B is shorter and weaker, but about the same in quality. So far as general appearance and character are concerned, Lot C is a top made from good wools and shows good breeding, while Lots A and B give the appearance of being made from ' wool with a past '.

“ You will notice that both these lots are apparently stained as the colouring is not the usual slightly yellow tint, apparent in most Cape wools. In view of the big difference between the treated and the untreated tops, we do not personally consider the matter is worth pursuing further. At the same time, in order to satisfy you in the matter, we are perfectly prepared to carry the wool through into yarn.

“ A further point to take into consideration is, in our opinion, that there is as much as 1d. per pound difference in value between the noil from Lot C and that from Lots A and B, while in the top we estimate the difference at 2d. per pound.”

(Signed) B. A. SMITH,
Director.”

I. *Laboratory Report on Fineness and Contour.*

The average results of measurements made by C. G. Winson on selected samples each of 200 fibres from the three lots of wool are as follows:—

Lot.	Mean Cross-sectional Area x 10 ⁻⁶ Sq. Cms.	Standard Error.	Coeff. of Variation.	Mean A/B.
A (Sodium Arsenite Dip).....	3.92	0.10	[%] 36.9	1.21
B (Plain Water Dip).....	3.83	0.10	38.6	1.23
C (Controls).....	3.85	0.11	41.3	1.19

The difference in fineness of the three lots of wool are without significance. The difference in contour (A-B) or shape of fibre cross-section are also insignificant. There is thus, apparently, no effect of the dipping on fibre thickness and contour.

II. *Strength Tests.*

A number of fibres were examined in the extensometer by Mr. Van Wyk, and the following results obtained:—

Lot.	Breaking Load (Arb. Units).	Standard Error.	Coeff. of Variation.	Extension at Break.	Standard Error.	Coeff. of Variation.
			%	%		%
A	3·065	± ·23	± 50·0	28·35	± 2·05	± 46·3
B	2·969	± ·18	± 39·6	25·90	± 1·73	± 42·7
C	3·261	± ·26	± 45·6	28·89	± 2·27	± 43·7

From the above it is obvious that the trade opinion is confirmed. Lot B was considerably weaker than Lot A, which in turn was weaker than the control Lot C. The extensions show the same fact, and since little difference in average fineness ensued it is obvious that the above differences afford a true contention.

Thus the effect of the dip has been to weaken the fibres consistently.

III. *Sulphur Content.*

The sulphur content of these wools was determined by J. Barritt, and the values expressed on the dry weights were as follows:—

“ A ”	3·48 per cent.
“ B ”	3·44 per cent.
“ C ”	3·47 per cent.

The values are substantially the same.

In order to have a final trade opinion, the British Wool Federation of Bradford appointed a small sub-committee to examine the tops made by the Preston Street Combing Co. Their report is as follows:—

“ BRITISH WOOL FEDERATION,
14 Piccadilly,
Bradford, 17th December, 1931.

Cape Wool.

“ With regard to the samples of top and noil submitted by Messrs. John Smith & Co., Ltd., I have to report as follows:—

“ Messrs. Broadhead, Ayrton & Harland have to-day examined the tops made by the Preston Street Combing Co.

“ They are of opinion that Lot C is a good average 70's quality, good 10-12 months' length, and good colour. Lot A somewhat longer than C and a good full quality lower, sound staple, but bad colour. Lot B not quite so fine as Lot C and rather shorter, weak staple, and the worst colour.

“ They are of opinion that the fleeces sent are hardly comparable for the purpose you desire, as they cannot think that the arsenite or water dipping could affect the quality or length of the wool unless the dipping had some effect on the health of the sheep, which, of course, they are unable to determine.”

(Signed) W. HARRISON.”

Conclusions.

“ The final conclusions which must be arrived at from the above indicate that the water dip has in some way or other vastly deteriorated the wool either by affecting the animal or in some other way. Possibly there has been some effect on the health of the animal since the sulphur content of the wool has not been changed. On the other hand, the arsenite dip again had a deleterious effect since the wool is graded as a good full quality lower and is a bad colour.

“ There is no doubt that these differences are real and we would say therefore that the effect of the arsenite dip has been found to deteriorate the wool.

(Signed) S. G. BARKER,
Director of Research.”

B.—ANALYSIS OF BATHURST WATER AND DIP, AS SUPPLIED BY THE CHEMISTRY DEPARTMENT OF THE GROOTFONTEIN SCHOOL OF AGRICULTURE, MIDDELBURG, CAPE.

Analysis of Bathurst Water.

Salts in Solution.	Percentage by Weight.	Remarks.
Calcium Carbonate.....	.0375	Temporary Hardness.
Magnesium Carbonate.....	.0105	
Magnesium Sulphate.....	.0090	Permanent Hardness.
Sodium Sulphate.....	.0045	
Sodium Chloride.....	.0780	
	.1395	

Degrees of total hardness 43.5 per cent.

Degrees of permanent hardness ... 6.0 per cent.

Degrees of temporary hardness ... 37.5 per cent.

Analysis of Dip.

On four different occasions the manager of Bathurst Experiment Station submitted samples of the dip as used in the experiment.

The correct strength of a seven-day dip solution is .16 per cent. As_2O_3 .

The four samples analysed were as follows:—

Sample.	Percentage As_2O_3 .	Percentage Error.
1.....	.167	+ 4.4
2.....	.167	+ 4.4
3.....	.156	- 2.5
4.....	.184	+ 15.0

DISCUSSION.

Regular weekly dipping in arsenite of soda does not influence the condition or body weight of the Merino adversely. The animals actually increased to the extent of 5.9 per cent. in live weight. Also, no deaths occurred, whereas at least one animal in the control group died of heartwater. Since no ticks were found on the arsenite dipped sheep in comparison with the controls it is to be concluded that the solution effectively checked tick infestation. This is of practical importance, for farmers who desire to farm Merino sheep on their tick-infested properties, can introduce Merinos immediately instead of postponing until such a time as the farm has been cleaned of ticks by means of cattle or non-woolled sheep. For two or three seasons such farmers will produce wool clips which have deteriorated somewhat in intrinsic value, but once the ticks are under control regular dipping can largely be dispensed with and normal wool production becomes possible.

The fleece is not influenced as regards greasy weight. This would indicate that the dipping process was not instrumental in washing out and removing the impurities from the fleece, but rather served to distribute these along the entire length of the staple. This, no doubt, was the cause of the unattractive appearance.

As regards fibre thickness in the three groups, the South African measurements (Table 3) indicate a slightly coarser wool in Group C, the undipped controls, whereas the Torridan results show slightly coarser wool in Group A, the arsenite dipped animals. Since both sets of measurements show only minor differences of no significance it is evident that dipping had no effect on fibre thickness.

Similarly in fibre contour, sulphur content and staple length no significant differences could be detected.

As regards tensile strength, members of the British Wool Federation consider that both the water- and arsenite-dipped wools are inclined to be tender near the bottom of the staple. This view was confirmed by tests carried out by Mr. van Wyk in the extensometer. The control lot was sounder than the dipped groups. It is of importance to note that the water-dipped wool was weaker than the arsenite-dipped. There is, however, a factor which must not be lost sight of in discussing the tensile strength of these wools. It is well known that any set-back to the health of a sheep results either in a complete break or a weakening in the fibres. The animals were in perfect health throughout, but during the four months preceding the final shearing, blow flies were very troublesome, and a number of the water-dipped animals as well as controls were struck; in fact, one sheep in the water-dipped group partly shed its fleece. None of the arsenite-dipped animals were attacked. This is a probable explanation why the wool from the water-dipped animals was less sound than that from the arsenite-dipped group.

For handle and appearance, the members of the British Wool Federation placed the three lots in order of merit: not dipped, arsenite-dipped, water-dipped. Messrs. John Smith & Sons, remarking on the dipped tops, state: "So far as general appearance and character are concerned, Lot C is a Top made from good wools and

shows good breeding, while Lots A and B gave the appearance of being made from wool with a pasty top. Also, "you will notice that both these Lots are apparently stained as the colouring is not the usual slightly yellow tint apparent in most Cape wools."

There is therefore no doubt that in respect of tensile strength and colour the dipped wools deteriorated to some extent. This deterioration is evident to nearly the same degree in both the arsenite-dipped animals and the water-dipped lot. It can thus be inferred that sodium arsenite as such did little, if any, damage to the wool fibre. The deterioration as mentioned is most likely due to the hardness of the Bathurst water. It is still an open question whether, if rain-water were used, which is free from salts causing hardness, the wools would have deteriorated to such an extent.

As regards the monetary value, it is pointed out by Messrs. John Smith & Sons, who scoured and combed the wools, that "there is as much as 1d. per pound difference in value between the Noil from Lot C, and that from Lots A and B, while in the top they estimate the difference at 2d. per pound." At the time this statement was made (23rd November, 1931) the top values at Bradford of average Cape of 10-12 months was quoted at 25½d. per lb. A difference of 2d. per pound meant about 8 per cent. reduction in value, which is equivalent to approximately 1d. per pound in the grease for a 50 per cent. yielding wool. This difference in monetary value is not great, yet the same authority when referring to colouring, states that "in view of the big difference between the treated and the untreated tops we do not personally consider the matter is worth pursuing further."

Nowhere was any difference found in differential response between the two types of sheep used, namely, plain bodied, long loose wool, and wrinkly bodied, short dense wool.

In conclusion we wish to express our indebtedness to Mr. R. Paine, Government Veterinary Officer at Grahamstown, for valuable suggestions; also to Mr. F. C. Smith, manager of the Bathurst Experiment Station, for being responsible for the management, dipping and weighing of the sheep.

SUMMARY AND CONCLUSIONS.

1. A Merino sheep dipping experiment is described at the Bathurst Experiment Station in the coastal region, which for the greater part is a tick-infested area.

2. Ninety Merino lambs were used. Half of the plain-bodied, long loose wool type and half the wrinkly short dense woolled type. Each group was divided into three lots of 15. The first lot dipped weekly in arsenite of soda of strength 2 pounds per 100 gallons of water, the second dipped in water, the third not dipped. There were thus thirty animals for each of the treatments.

3. The aim of the experiment was to establish whether the Merino sheep could withstand and adapt itself to dipping at weekly intervals for twelve months and what effect such dipping will have on the fleece.

4. Results show that weekly dipping does not influence the condition of the sheep as reflected in body weight.

5. All sheep dipped in arsenite of soda, survived after a year's treatment, and were always free from ticks and blowfly trouble.

6. Arsenite of soda had no influence on fleece weights, fibre thickness, staple length and fibre contour.

7. As regards colour, handle and appearance the wools dipped in arsenite and in water have deteriorated to some extent. Deterioration is practically of the same degree in the two dipped groups and presumably due to the hardness of the Bathurst water and not to the arsenite of soda dip.

8. As regards monetary value, as given by Messrs. John Smith & Sons, there is as much as 1d. per pound difference between the Noil from the control and that from the dipped lots, and in the Top a difference of 2d. per pound. The latter quotation at the time of estimating (23rd November, 1931), meant a difference of approximately of 1d. per pound in the grease for a 50 per cent. yielding wool, or a reduction in value of about 8 per cent.

9. There was no difference in response between the wrinkly bodied short dense woolled sheep and the plain bodied long loose woolled animals.

REFERENCES.

1. ALEXANDER, R. A. (1931). Heartwater—the Present State of our Knowledge of the Disease. *17th Rept. of the Dir. of Vety. Ser. and A.I., Union of S.A.*, pp. 89-150.
2. BEDFORD, G. A. H. (1926). The Sheep Ked. *Jnl. Dept. of Agric.*, Sept.
3. McKELLAR, D. W. (1930). The Bathurst Experiment Station. *Farming in South Africa, Dept. of Agric., Pretoria*, Dec., pp. 395-396.
4. WARREN, E. N. S., MARE, G. S., AND ROUX, L. L. (1928). A Survey of Sheep Farming Conditions in the South East Coastal Districts of the Cape.
5. Average Quotations for Tops in Oil (1931). *The Wool Record and Text. World.*, Nov.
6. Dipping. *Handbook for Farmers in South Africa* (1929). Dept. of Agric., Union of S.A., 249.
7. The Effect of Various Dips on Wool (1926). *Jnl. of Agric., Union of S.A., Pretoria*, Vol. 12, p. 249.