

1952.

WESTERN AUSTRALIA

H. 26  
THIS BOOK IS  
THE PROPERTY OF THE  
LEGISLATIVE COUNCIL  
AND MUST  
NOT BE REMOVED

LEGISLATIVE ASSEMBLY

# HONORARY ROYAL COMMISSION

APPOINTED ON THE 12TH SEPTEMBER, 1951.

to inquire into

THE EFFECT GENERALLY  
of  
THE APPLICATION OF LIME WITH SUPER  
upon  
THE FERTILITY OF THE SOIL.

#### TERMS OF REFERENCE.

To inquire into the efficacy of the agricultural practices of Mr. Eric Farleigh, the desirability of their wider application in heavy rainfall areas, the effect of their adoption on the sulphur supply position and the railway position, and the availability of lime for agricultural purposes.

#### MEMBERS OF COMMITTEE.

J. M. Hearman, Esq., M.L.A. (Chairman), J. H. Ackland, Esq., M.L.A.;  
E. K. Hoar, Esq., M.L.A.; J. I. Mann, Esq., M.L.A.; Hon. E. Nulsen, M.L.A.

PERTH :

By Authority: WILLIAM H. WYATT, GOVERNMENT PRINTER.

LEGISLATIVE ASSEMBLY.

HONORARY ROYAL COMMISSION.

APPOINTED ON THE 12TH SEPTEMBER, 1951:

to inquire into

THE EFFECT GENERALLY

of

THE APPLICATION OF LIME WITH SUPER

upon

THE FERTILITY OF THE SOIL.

The Commission took evidence, from 26 witnesses in all, of whom seven officers of the Departments of Agriculture or Mines, one a lecturer from the University, and four could be classified as having specialised knowledge of the industrial production of artificial fertilisers or soil conditioners. The remaining witnesses were all practical farmers or laymen interested in farming.

The Commission visited in all seven farms situated as follows:—one at Pinjarra, one at Waroona, three at Boyup Brook and two at Bridgetown.

It is not intended in this report to comment in great detail on the evidence of every witness, but, in the opinion of the Commission, some evidence is of such interest or importance as to warrant close study and consideration.

Generally, as was perhaps to be expected, there is some conflict of opinion among witnesses, this being particularly noticeable among the expert witnesses, but there were also many points of unanimity.

Farmer witnesses generally showed a keen interest in the subject matter of the Commission's inquiry and, in almost all cases, expressed a belief, at times amounting to a conviction, that there is scope for the much wider use of lime in agricultural practice in the South-West. This viewpoint is understandable because, naturally, those most interested in the use of lime were the ones most readily offered to give evidence.

All witnesses, expert or laymen, were emphatic that much more research work is necessary into agricultural problems in the South-West and the State generally. This need for further research and scientific data is unquestionably, to some extent, responsible for the diversity of opinions expressed by expert witnesses. In a number of instances, expert witnesses based answers to questions on data gained in other parts of the world because no local scientific information was available to them. This was particularly noticeable in the case of Mr. D. P. Drover, lecturer in soil science at the Institute of Agriculture, who, when asked ques-

tions bearing on local problems, frequently gave answers based on results of research carried out elsewhere.

This lack of scientific evidence based on local investigation proved at times frustrating to the Commission, as sometimes farmers put forward a contention, based on observation, which experts often agreed was quite probably correct and yet were unable to uphold scientifically. This is well illustrated by reference to certain evidence about the increased palatability of pastures top dressed with lime.

All expert witnesses agreed that indiscriminate heavy dressings of lime were undesirable, that they would often be uneconomic and might be detrimental to the soil. Dressings of 2 cwt. per acre were quite safe in that they would not harm the soil, but may not in all cases prove economic. The importance of determining the soil acidity or p.h. factor of the soil before applying lime in larger quantities than 2 cwt. was agreed upon, although there was a difference of opinion as to the method to be used in determining the p.h. factor.

All local officers of the Department of Agriculture examined were of the opinion that the most desirable means of determining the p.h. factor of any soil was the electrical method, a method not practically applicable to the conduct of a large number of soil tests under field conditions.

However, Mr. H. D. Kerr, a director of Cuming Smith Mt. Lyell (N.Z.) Ltd., a man with some 40 years practical experience of applying science to agriculture, both in Australia and New Zealand, described a method he had personally used for many years for testing soil acidity in the field. He considers this quite suitable for the use of field officers and farmers instructed in its use. Mr. R. W. Scott of Bridgetown also demonstrated a soil testing outfit which cost about £5 and was claimed to be quite satisfactory for use in the field by farmers. There was no evidence that these field testing methods were inaccurate. The Commission accepts Mr Kerr's opinion in this matter.

Dr. Dunne, the Plant Nutrition and Research Officer of the Department of Agriculture, gave a lengthy and lucid resume of the work done on the use of lime and current experiments on other fertilisers used in W.A. The Commission are also indebted to him for bringing to their notice some private opinions expressed by Mr. H. A. Pitman of Victoria in respect of the use of "reverted" or di-calcic phosphate and the fixation of phosphate by iron and aluminium, which opinions are in direct conflict with his own views.

The Commission, consisting entirely of laymen, when confronted with two opposed views coming from men trained in agricultural science and with a sound knowledge of conditions in W.A., can only conclude that this is a case where experts differ, particularly as neither Dr. Dunne nor Mr. Pitman has ever visited Mr. Farleigh's property where di-calcic phosphate has been used.

However, Dr. Dunne and the Commission agree that Mr. Pitman is correct when he says: "If a farmer produces better stock than his neighbours on similar country, his method should be adopted in preference to fancy theorising. Theorising should walk in the footsteps of proved practice—not attempt to take its place."

In view of Dr. Dunne's acceptance of this statement of Mr. Pitman's, the Commission find it difficult to understand just why Dr. Dunne has never been to Mr. Farleigh's property, particularly as he has several experimental plots near Mr. Farleigh's property at Boyup Brook.

His statement made on September 18th that he would like to visit Mr. Farleigh's property, but would be unable to do so this year, seems lacking in conviction.

Mr. H. G. Elliot, Acting Superintendent of Dairying and formerly Agrostologist of the Department of Agriculture, expressed the opinion that lime would be of benefit in certain limited areas distributed throughout the South-West, starting at North Dandalup and continuing down the coast to about Brunswick, also at Margaret River, Manjimup, Northcliffe, Denmark and Albany. However, he stressed the point that there was always a danger that too much lime might alter the botanical composition of a pasture detrimentally.

With respect to Mr. Farleigh's success, Mr. Elliot expressed the opinion that the trace elements, zinc and copper, which had been used all over Mr. Farleigh's property, were the explanation of any advantage that might be claimed for his agricultural methods. Mr. Elliot did not attribute any gain on this property to the use of lime in any form, with the exception of the lucerne paddocks which nobody disputed needed lime.

Mr. Elliot further expressed the opinion that Mr. Farleigh, in point of fact, had no better carrying capacity than numerous other farmers in the district, mentioning, amongst others, Messrs. P. D. Forrest and W. W. M. Hack. The latter property he claimed to be similar and perhaps inferior to Mr. Farleigh's. Mr. Hack's evidence of carrying capacity and maintenance of pastures does not support Mr. Elliot's contention.

The relative carrying capacities of the three properties on the evidence given, expressed in terms of cattle, are as under—

Farleigh	....	....	3½	acres to beast.
Hack	....	....	4	" " "
Forrest	....	....	5	" " "

In the opinion of the Commission, based on observation, neither Mr. Farleigh nor Mr. Forrest is stocked to capacity, but Mr. Hack must be approaching his limit. The Commission's opinion in respect of Mr. Farleigh's property is endorsed in evidence by Mr. Reg Hester of Bridgetown.

Both Mr. Forrest and Mr. Hack have used zinc and Mr. Forrest some copper, although neither has used them to the extent that Mr. Farleigh has done. Neither of these gentlemen has used any lime but both showed a keen interest in it and expressed their intention of trying some. Mr. Hack spoke of the deterioration of his pasture, although Mr. Forrest was satisfied that his was being maintained.

In the face of this evidence, the Commission cannot accept Mr. Elliot's contention that surrounding farmers are carrying as many stock per acre as Mr. Farleigh is carrying.

It is not suggested that Mr. Elliot was trying to mislead the Commission. Evidence given by Dr. Snook, Animal Nutrition Officer, indicated that no calcium deficiency existed in any pastures in W.A. that were topdressed. This contention was supported by the Acting Director of Agriculture, Mr. McKenzie Clark.

The evidence of Mr. H. D. Kerr of Cum- ing Smith Mount Lyell (N.Z.) Ltd. was one of the most valuable contributions of all the evidence given. It was the result of 40 years or so of practical experience of applying science to agriculture and was couched in simple language that was easily understood by laymen.

Mr. Kerr's first experience of W.A. goes back to 1912, and it is of interest to note that, even then, there was scientific opinion that di-calcic phosphate might have a useful application in W.A. It is Mr. Farleigh's practice to make di-calcic phosphate by reverting superphosphate or mono-calcic phosphate to di-calcic phosphate with lime.

Mr. Kerr gave evidence of the increase in agricultural production in New Zealand resulting from the increased use of lime and di-calcic phosphate.

He had also done some soil tests recently in W.A. on soils coming from as far apart as Albany and Moora. He had found some particularly acid and considers that, from some tests, tons of lime to the acre would be needed to establish good clover pastures. However, with regard to lime, his evidence substantially supports Mr. Farleigh's practices and his advice might be summarised with respect to lime application as "a little and often." His working rule that for every breeding ewe carried it will require about 40 lbs. of lime annually to maintain the calcium status of the soil, is a simple one easily understood by farmers.

It is significant that a man who has worked a lifetime with a concern manufacturing superphosphate should be such a strong advocate of the use of much greater quantities of lime. It is interesting to record that Mr. J. D. Cuming of Cuming Smith Mount Lyell (W.A.) Ltd. asked to be allowed to listen to Mr. Kerr's evidence and subsequently received a copy of it. Mr. Cuming had previously given evidence and had expressed concern at the fall in agricultural production in relation to the amount of super used. He had expressed a willingness to endeavour to make some di-calcic phosphate available next season if a demand for it were established or if he were requested to do so by the Government.

The Commission is greatly indebted to Mr. Eric Farleigh for his detailed evidence and the great trouble he took and courtesy extended to members of the Commission, in explaining in great detail his methods, and giving the history of almost every paddock on his property. The Commission regard Mr. Farleigh as an excellent farmer and one with a tremendous capacity for detail.

The Commission is aware that, in some quarters, there is a tendency to suggest that a lot of Mr. Farleigh's current success is due to his previous heavy applications of superphosphate. In the minds of the Commission this viewpoint is refuted by the excellent result Mr. Farleigh has achieved on a 60-acre paddock in its first year of pasture establishment, on land that has a previous history of no manurial treatment whatsoever. He has established an excellent stand of sub. clover, lupins and Dunn peas with a dressing of a bag of super and one of lime to the acre on land which, in the words of Mr. J. H. Ackland, a member of the Commission, "Would make an excellent gravel pit."

The results he has achieved with ground rock phosphate (tri-calcic phosphate) on old pastures with a previous history of liming indicate to the Commission that there is room for much further research into this question, and suggest a possible partial solution of the problem that could arise in the event of sulphur supplies from oversea ceasing abruptly. Mr. Farleigh has obtained an excellent response from his application of this fertiliser in its first year.

Mr. Farleigh's evidence showed that his farming practices were based largely on the instruction he received at the Hawkesbury Agricultural College in 1922. From this beginning he seems to have followed a logical sequence of thought, his ideas first being tried on a small-scale and subsequently given full field application. Briefly, he considers that superphosphate, lime and trace elements are all essential on his country, and that the p.h. factor is most important and should be more widely used as a guide to the treatment most necessary for any given soil.

All his pastures were in the opinion of the Commission, good and generally equal to or better than those seen elsewhere and his lucerne phalaris tuberosa and veldt grass pastures were outstanding.

The two visits which members of the Commission made to this property were very helpful and interesting. Those who had not previously seen any of Mr. Farleigh's pastures, but had listened to considerably expert evidence which tended to discount results he might have achieved, were forced to re-examine that evidence in the light of their observations.

The evidence of Mr. P. D. Forrest was most helpful and indicated the importance of and necessity for the fifth recommendation of the Commission dealing with the re-organisation of the Department of Agriculture. Mr. Forrest subsequently assured the chairman that he had no intention of directing any personal criticism whatever at any officers of the Department and the Commission has not read that into his evidence. However, Mr. Forrest is a farmer who has worked closely with officers of the Department of Agriculture and has made a study of the set-up in New Zealand, and his remarks in connection with the need for further research and investigation are fully concurred with by the Commission.

Although it is outside the scope of the Commission's enquiry, members feel that to make no reference to Mr. Forrest's methods in establishing new pastures on virgin country, would be an oversight.

Mr. Forrest showed us an extensive area of country timbered with red gum, jarrah and white gum which had only had the light timber removed, everything over about six inches in diameter and sound being left untouched, in its green state. A converted bren gun carrier had been used to do the clearing. The ground had been lightly cultivated after the fire with a spring-tooth cultivator and sown with sub clover and 2 cwt. of superphosphate.

Members of the Commission saw an amazingly even, dense pasture about 18 inches high of early and mid-season sub clover in its second year of establishment. This method of land development commends itself to the Commission as being relatively quick, cheap, and not needing much heavy

machinery and possibly it may avoid some of the difficulties that are besetting some of our older pastures. Apart from the agricultural aspect altogether, its wider adoption must result in a conservation of millable and potentially millable timber, and a reduction of the heavy bush-fire menace in our forest areas. In the opinion of the Commission, this is a matter that could well receive further and immediate attention from the Government. Mr. Forrest gave credit to Mr. H. G. Elliot of the Department of Agriculture for his assistance and encouragement in this land development project.

The Commission took evidence from seven farmers in the Bridgetown area, all of whom were extremely interested in the wider use of agricultural lime. Three of the seven, Messrs. Egerton-Warburton, Pearse and W. N. P. Scott, all gave evidence of pasture improvement effected in old pastures by the use of relatively small dressings of lime. The Commission subsequently inspected the property of Mr. P. Egerton-Warburton and were amazed at the improved quality and quantity of pasture on an old paddock that had been top-dressed with 2 cwt. of lime plus 80 lb. of superphosphate, as compared with a similar paddock alongside that which had received 360 lb. of superphosphate. Mr. Egerton-Warburton also noted, in common with other witnesses who had experience of lime, that stock showed a preference for lime top-dressed pastures.

The evidence from this group of farmers showed a marked tendency for pastures to deteriorate with the passage of time, Mr. W. S. Bagshaw's evidence being particularly strong on this point.

The evidence of Messrs. Reid and Doust on the improvement noted in stock as a result of adding lime to their drinking water is extremely interesting, and while in conflict with the expert opinion of Dr. Snook and Mr. Mackenzie Clark, may indicate that the last word has not yet been said on calcium deficiency in cattle.

Members of the Commission are indebted to Mr. R. W. Scott for his demonstration of his outfit for testing soil acidity and in the opinion of the Commission equipment of this nature could, with advantage, be more widely used.

The Chairman also wishes to thank Mr. Scott for his interest in this inquiry and for his assistance in assembling witnesses in Bridgetown.

Due to circumstances beyond the Commission's control, the taking of evidence was spread over a much longer period than was originally intended. One advantage of this was that it was possible to take evidence from Mr. M. Cullity, the Superintendent of Dairying, after his return from his trip to England and Europe.

Mr. Cullity's evidence was in general agreement with Dr. Dunne and Mr. Elliot insofar that he was emphatic that, as yet, the Department was in no position to make any general recommendations about the use of lime in W.A. However, he did give the impression that he thought that a much greater part would be played in the future by lime when more information was available. He stressed the need for further research. His evidence about the different degrees of acidity required or tolerated by different crops was very interesting and, indirectly, gave further weight to Mr. Kerr's opinion that differing degrees of acidity were desirable in the one paddock.

The coloured slides Mr. Cullity showed the Commission illustrated very clearly the likes and dislikes of certain plants to acid and alkaline conditions. Modification of this idea to local conditions and plants may prove of assistance to farmers in determining their soil conditions.

Mr. H. E. Braine, General Manager of Bulk Handling, was called. His evidence of his own farming activities in the Chittering Valley since 1929 was strikingly consistent with Mr. Farleigh's although there was no collaboration. Mr. Braine had used lime in various ways for a number of years and was quite convinced that his carrying capacity and cropping results were substantially increased by the use of lime. Mr. Braine had not conducted any very exact or detailed experiments but his results over more than 20 years convinced him of the desirability of using some lime on his country.

The last witness called was the Acting Director of Agriculture and he told of the difficulties of the Department of Agriculture and what steps were being taken to overcome them.

Much has been said in this report about the need for greater facilities being available in Western Australia for agricultural research. The Commission is aware that its function was not to investigate the activities of the Department of Agriculture, but in so many instances were they frustrated by being told that either no work or insufficient work had been done on any particular question that they can only conclude that our Department of Agriculture should receive much more help from the Government.

There is no wish to reflect on officers of the Department of Agriculture, but Mr. Cullity's evidence of officers doing research work being called upon to do administrative jobs and answer the telephone as well as can scarcely be taken as an indication of circumstances which are conducive to sound research work being carried out.

In view of the inconclusive evidence in connection with the use of ground rock phosphate, the Commission is unable to make any findings with respect to the sulphur position or the railway position.

Members of the Commission are unanimously of the opinion that Mr. Farleigh has done a service to agriculture in this State in developing his methods. A wider application of his methods would, they feel sure, result in a considerable increase in the productivity per acre in the heavy rainfall areas. The recommendations that go with this report would, members feel, indicate the manner in which the State may best take advantage of the lead given by Mr. Farleigh.

In conclusion, it is the wish of members of the Commission to place on record their thanks to all those witnesses who came for-

ward to give evidence, members of the Hansard Staff and drivers of cars from the Government garage whose willing co-operation made the task of the Commission easier. To Colonel J. C. W. O'Connor goes our especial thanks for his work as Secretary.

It would be unfitting to close this report without expressing the gratitude of members of the Commission and staff to the wives of Messrs. Egerton-Warburton, E. Farleigh, P. D. Forrest and W. W. M. Hack for the hospitality they extended to us all.

JOHN HEARMAN,  
Chairman.

---

## FINDINGS.

The Commission having taken evidence from 26 witnesses and inspected seven properties finds:—

- (1) There is a definite place for the use of lime in our agricultural practices.
- (2) That further research and experiments are necessary to determine the quantity to be used, and the methods of using lime.
- (3) That there is a very definite interest in lime on the part of many progressive farmers.
- (4) That a serious deterioration of pastures has occurred in the South-West on land which has been top-dressed with superphosphate for a number of years.
- (5) That the Commission has seen very definite results obtained from the use of "reverted" super or di-calcic phosphate and also from ground rock phosphate on ground with a previous history in liming.
- (6) There is evidence of improvement being effected in old pastures by reducing the amount of phosphate and applying lime.
- (7) That large quantities of lime are not always necessary to produce beneficial results.
- (8) That there are unlimited quantities of lime available in South West Australia.
- (9) That there is evidence of stock showing a preference for and doing better on limed country.
- (10) That harm could result from over-liming country that does not need lime. The p.h. factor or degree of soil acidity is most important.
- (11) That up to 2 cwt. per acre of agricultural lime may be used anywhere in the South-West with safety. Much more may be applied where the p.h. factor indicates the need for it.
- (12) That the policy of applying lime "a little and often" would be the wisest to adopt in the absence of expert advice to the contrary.
- (13) That a great variation exists in the effectiveness of various form of lime available in Western Australia.
- (14) That sufficient facilities already exist in Western Australia for the production of considerable quantities of agricultural lime.
- (15) That a judicious use of lime would enable better results to be obtained from phosphatic fertilisers in the South-West.
- (16) That lime may accentuate zinc and copper deficiencies but may correct molybdenum deficiencies.
- (17) That the Department of Agriculture is unable to deal effectively, owing to lack of staff equipment and accommodation with many urgent problems.

## RECOMMENDATIONS.

(1) That experiment and research be instigated forthwith with the object of—

(a) comparing the results obtained from using "reverted" superphosphate or di-calcic phosphate with superphosphate on—

(1) gravel soils;

(2) clay soils;

(3) all soils that have had upwards of 1 ton of superphosphate per acre applied;

(b) determining the extent to which lime increases the availability of phosphate applied as ground rock phosphate on old pastures;

(c) determining the extent to which, if any, lime frees the residual phosphate in old pastures.

(2) That scientific comparisons be made of the various forms of lime available in Western Australia to enable farmers to determine the best form for them to use, bearing in mind the freight factor.

(3) That the Fertiliser Act be amended to compel vendors of lime for agricultural purposes, to state the analysis and fineness of grinding of their product.

(4) That C.S.M.L. be asked to make 500 tons of "reverted" superphosphate available for this coming season.

(5) That in view of the apparent lack of enthusiasm on the part of some officers of the Department of Agriculture to consider further experimentation with ground rock phosphate and di-calcic phosphate, consideration be given to inviting the Institute of Agriculture at the University to collaborate with the Department of Agriculture in instituting further experiments.

It is suggested that these experiments be conducted in collaboration with selected farmers, and trials be conducted under full field conditions, on land selected by officers.

(6) That the Department of Agriculture investigate methods for determining the p.h. factor which would make this information more readily available to farmers.

(7) That urgent consideration be given to the re-organisation and expansion of the Department of Agriculture.