

By W. A. Hamilton, The striking lectures by Dr. A. E. V. Richardson should be rend by every land worker throughout the State, It would be difficult to express in a few words the full value of Dr. Richardson's addresses, but it is most interesting to hear that it our farmers adopt more scientific methods there is at least a possibility of frebling our wheat yield. This increase does not apply to wheat only, but might be obtarned in the production of meat and wool, as well as in wheat. Still further, it might be said, although the matter was not dealt with by Dr. Richardson, that in fruit and vine culture much better results could be obtained if more attention were paid to the practical discoveries of science in re-When we are lation to these matters. told that Germany during the last 30 years has increased her wheat, cats, barley, and rye yield from 20.5 to 35.6 bushels to the acre, it makes us think that if Germany can make that huge increase, Australia

And so she should, A Prominent Point.

should obtain similar if not equal results.

But if there is one point that is more prominent than another in Dr. Richardson's lecture it is in his statement of the deterioration of grass lands, as follows:-"It was a matter of common observation that many of their native pastures showed signs of deterioration, and in some cases the live stock showed evidence of malnutrition. Natural pastures deteriorated through overstocking and injudicious grazing, and the continued removal from the soil of the elements of mutrition by the annual crop of wool, lambs, and fat stock without the replacement of these nutritive elements by means of fertilizers. In addition, in the heavier rainfall districts mineral nutrients, e.g., nitrates and lime, were actually leached out of the soil by the heavy rains." Further, he says:-"The amount of mineral nutrients removed from the land by the annual crops of live stock was considerable. Of these nutrients, the phosphates were of special inportance on account of the low phosphate content of Australian soils." It is clear from these two quotations that our natural pastures and cereal lands have an enormous quantity of nutrients, such as nitrates and lime, taken out of them year by year, and it should not be difficult to understand that if we continue to take certain elements out of the soil by cropping or stocking the soil must deteriorate in exact proportion of the amount taken out, unless we put them back again.

Two Causes of Exhaustion. Later on in the address the doctor points ont that while phospheric acid and notash are firmly held by the soil, nitrates and lime suffer by leaching out as well as by growing crops. Thus it appears that while phosphorie acid and potash have one drain on them, and one only, nitrates and lime suffer from two causes of exhaustion, and this bears out the theory I have promulgated for a long time that while it is undoubtedly necessary to replenish the store of phosphates in the soil it is often more necessary to replace the nitrates and lime. Although it is well known that nitrates may be produced by such plants as clover and peas, and the nitrate content of the land greatly improved by the rotation of crops, there is no natural method known to science that will replace the lime unless it rises from greater depths of the soil, which is doubtful. One of the things that scientists are agreed on is that lime is an essential element for the production of healthy plant life, and as it leaches out by rainfall and is consumed by the growing plants and carried away it seems a logical deduction that if the correct proportion of lime is to be maintained in the soil it can be done only by artificial methods. There is indubitable evidence of shortage of lime in many of our pastures and wheat lands About 12 months ago I was in the Bald Hills (Inman Valley) district, which for some years was recognised as the finest grazing land in the

Local Producers' Experiments. An Englishman there, bir. o. he had spread about a ton of lime to the, sere that year, and he declared that he had fattened more stock on that small paddock than on a much larger area on tother parts of his estate. He showed me that the grass there was of a rich and greener nature, also that it was eaten down short, and be then drew my attention to a paddock near by where the grass was more than a foot high, and said that if he turned his stock into the last paddock they would not stop there if they could get on to the paddock that had been Kared. The paddock with the long grass had been treated with superphosphate only, and the puddock with the short where he had fattened his stock had been treated with lime. He recommended me to see several of his neighhours. I did so, and they all told me that, although they got large quantities of grass, is seemed to lack the power of intlemma the storic. In several cases that I have heard of, and which I know

to be true, excellent results have been obtained by using superphosphates only but I think the weight of evidence will support the theory that if lime be added to the grass lands the superphosphate will have a much helter effect than if the brace be omitted. If the soil is lacking in lime super may, and probably will, cause a rank growth of grass, but it will not produce fat, healthy stock. Another sheep farmer in a large way told me a few days ago that on an estate he had recently bought in the Barossa district he had grass from 6 to 12 in, high with sheep running about in it as poor as crows, and he was making efforts to prove that that estate could carry double the number of sheep that it had been carrying the last iew years.

Deficient in Essentials. Although I urged the use of lime, he seemed to think that superphosphate was the thing requird. I fully agreed that there was every probability of a shortage of phosphoric acid in the soil, but pointed out that there was even a greater probability of a shortage of lime. In the absence of an analysis one would be fairly safe in saving that the land was deficient why his sheep could not fatten. It seems

to me to be utterly impossible to expect rich succu ent grass to grow on those lands only way to secure a genuine and perma- on the subject, duction."

Improved Farming Methods. I think there is little doubt but the farm-

ing methods in South Australia have enoror the simple things that were well known to practical farmers of the Old Country, who had nothing in the way of artificial manures to help them? I am certain they are not. It is true that the methods of these old farmers were slow, but it is also true that in England alone for at least 1,000 years they almost continually obtained good crops without any of what we to-day would call scientific knowledge. But there was one important thing they did know and practised continually, and that was the use of lime. It is no exaggeration to say that long before the expiration of even 100 years by our present neglect of lime the soils of South Australia will have deteriorated to such an extent that we shall get no crops at all unless and that is the replacement of lime in the I do not mean by that they should

been, the most neglected in Australia. Neglectful Farmers.

Richardson, mention should be made of the Roberts, showed me a paddock on which | development of soil micro-organisms in lime. influencing general soil fertility. It was "Although it is well known that nitrates

Striking Proof.

to kill sorrel, and that is by sweetening the zoil with carbonate of lime, and it requires, as Professor Perkins says, a ton to the acre. But the money so expended will give a rich return to the farmer, and will keep his land in good heart for eight or ten years. I was much impressed with a remark one farmer in the Strathalbyn district made to me just year. "This infernal sorrel," he said, "has got all over my land and I can't get rid of it. I've ploughed it, scarified it, and put slicep on it, and done everything I could think of to kill it, but it seems to grow stronger than ever." I mildly suggested that lime would kill it. "I don't know about lime." he said impatiently, "I've never tried it but I know jolly well that if I don't get rid of this sorrel, it will get rid of me.

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TREBLING THE WHEAT YIELD.

LIME WILL HELP,

Mr. W. A. Hamilton writes:-"The striking lectures by Dr. A. E. V that have been grazed for many years Richardson should be read by every land without lime and phosphoric acid being worker throughout | 2he | State. I am added to them. Precisely the same argu- afraid, however, that they will not be ment applies to our wheat lands, and in an nearly as widely read as they should be. article of mine which you were Judging from my experience among the good enough to publish some weeks farmers the last few years it seems to me ago I urged the same point. that the great amount of literature that There is no radical difference between a is poured out for their benefit falls to a crop of grass and a crop of wheat, and large extent, on unheeding ears. It is with land must become exhausted by constant a view to stimulating, interest in the great cropping or grazing. Towards the end of subject of increasing our primary produchis lecture Dr. Richardson says:- 'The tion that I venture to offer some remarks required. I fully agreed that there was

was to improve the farming methods of the of a highly scientific lecture is ignored that there was even a greater probability country, and apply the teachings of by the majority a few comments on the of a shortage of lime. In the absence of science to every branch of primary pro- lecture itself will draw attention to it, and an analysis, one would be fairly safe in cause it to be read afterwards with great saying that the land was deficient in both interest. Hence my reason for this article, of these essentials, and that was why his It would be difficult to express in a lew sheep could not fatten. It seems to me words the full value of Dr. Richardson's to be utterly impossible to expect rich mously improved the last 30 years, but addresses, but it is most interesting to hear succulent grass to grow on those lands the question is "Are formers doing some that it our farmers adopt more scientific that have been grazed for many years methods there is at least a possibility of without lime and phosphoric acid being trebling our wheat yield. This increase added to them. Precisely the same argudoes not apply to wheat only, but might ment applies to our wheat lands, and in an be obtained in the production of meal article of mine which you were good enough and wool as well as in wheat. Still fur- to publish some weeks ago I urged the ther, it might be said, although the matter same point. was not dealt with by Dr. Richardson, that "There is no radical difference between in fruit and vine culture much better re- a crop of grass and a crop of wheat, sults could be obtained if more attention and land must become exhausted by conwere paid to the practical discoveries of stant cropping or grazing. Towards the science in relation to these matters. When end of his lecture Dr. Richardson said:we are told that Germany during the last. The only way to secure a senuine and 30 years has increased her wheat, oats, permanent increase in the output from the barley and rye yield from 20.5 to 35.6 land was to improve the farming methods of bushels per acre, it makes us think that the country, and apply the teachings of science Germany can make that huge increase Australia should obtain similar, if not equal, results, and she should. the farmers pay attention to at least one than another of Dr. Richardson's lectures it is in his statement of the deterioration of grass lands, as follows:-

neglect the use of super. That would be many of their native pastures showed signs of artificial manures to help them? I am nothing short of madness, but it should not deterioration, and in some cases the livestock certain they are not. It is true that be forgotten that while soil is composed showed evidence of malnutrition. Natural passof many elements, some of which are untures deteriorated through overstocking and inslow, the one thing that should be judicious grazing, and the continual removal from alone, for at least 1,000 years, they almost better known perhaps than any other is annual crop of wool, lambs, and fat stock withlime, and that is the one that is, and has out the replacement of these nutritive elements any of what we to-day would call scientific by means of fertilisers. In addition, in the knowledge. beavler rainfall district mineral nutrients, e.g., tant thing they did know and prac-

"Further on he says:-

has convinced me that the valuable infor- "It is clear from these two quotations mation concerning the use of lime which that our natural pastures and cereal has for years been given by the profes- lands have an enormous quantity of sor has not been taken advantage of to nutrients, such as nitrates and lime taken the extent that might reasonably have out of them year by year, and it should been expected. Still, there is hope for the not be difficult to understand that if we future, and as constant dripping will continue to take certain elements out of wear away a stone, it is just possible that the soil by cropping or stocking the soil the farmers are at last waking up to the must deteriorate in exact proportion to professor's advice. The following quota- the amount taken out unless we put them tions from his last address should be back again. Later on in the address the pasted on the outside of every farmer's hat, doctor points out that while phosphoric Referring to the subject of liming the soil acid and potash are firmly held by the soil, he said:- 'Lime was an essential consti- nitrates and lime suffer by leaching out as tuent of practically all plants, which could well as by growing crops. Thus it appears only get it from the soil. It was an essen- that while phosphoric acid and potash have tial constituent of all the higher animals, one drain on them and one only, nitrates and, apart from the soft tissue requires and lime suffer from two causes of exhausments of the flesh, bones were comprised tion, and this bears out the theory I have mals derived their lime, their lime, that the mals derived their lime, that while it the farmers has convinced me that the mals derived their lime ultimately from is undoubtedly necessary to replenish the plants, and also indirectly from herbivorous store of phosphates in the soil, it is often animals. It was essential to the healthy more necessary to replace the nitrates and

an important fact r in that it affected the may be produced by such plants as clover hope for the future, and as constant dripavailability to plants of some essential soil and poas, and the nitrate content of the constituents, such as phosphoric acid, land greatly improved by the rotation of Lime exercised an important action on the crops, there is no natural method known to waking up to the professor's advice. The mechanical condition of soils, and particulacione that will replace the lime, unless it following quotations from his last address larly heavy soils. When lime we have soils and particulations from his last address are soils. soils generally became some was absent rises from greater depths of the soil, which should be pasted on the outside of every soils generally became sour. Some sour is doubtful, One of the things that farmer's hat. Referring to the subject of plants that were able to special types scientists are agreed on is that lime is an of liming the soil, he said: of plants that were able to thrive under essential element for the production of Lime was an essential constituent of practic such conditions. Most plants, and esp- healthy plant life, and as it leaches out by cally all plants, which could only get it from cially cultivated ones, suffered in sour rainfall and is consumed by growing plants the soil. It was an executial constituent of all and carried away, it seems a logical deduc- the higher animals, and, sport from the soft For a striking proof of these words let is to be maintained in the soil it can be prized almost entirely of phosphate of less tanghorne's Creek, Milang. Belvidere, done only by artificial methods. There is plants, and also indirectly from herbivorus and indubitable evidence of a shortage of lime mals. It was cascutial to the healthy decelerbe will see thousands of newton, and in many of our pastures and wheat lands; ment of soil micro-organisms in influencing growth will see thousands of newton and in many of our pastures and wheat lands; ment of soil micro-organisms in influencing growth and in many of our pastures and wheat lands; ment of soil micro-organisms in important factor he will see thousands of agree of beauti- About twelve months ago I was in the Bald ral soil fertility. It was an important factor ful land covered with sorrel, a most de- Hills, Inman Valley district, which for in that it affected the availability to plants of structive and useless weed which some some years was recognized as the finest some essential soil constituents, such as perfarmers are trying to kill with sultivation, grazing land in the State. An Englishman phorie soid. Lime exercised on important and morth a condition of soils and Americans say. There is a the there, Mr. J. B. Roberts, showed me a particularly heavy solls. Americans say. There is only one way paddock on which he had spread about one

ion of lime to the acre that year, and he declared that he had fattened more stock on that small paddock than on a much larger area on other parts of his estate. He showed me that the grass there was of a richer and greener nature, also that it was eaten down short, and he then draw my attention to a paddock near by, when the grass was more than a foot high, and said that if he turned his stock into the last paddock they would not stop there if they could get on to the paddock that had been limed. The puddock with the long mass had been treated with superphosphate only, and the paddock with the short grass, where he had fattened his stock, had been treated with lime. He recommended me to see several of his neighbors, and I did so, and they all told me that although they got large quantities of grass it seemed to lack the power of fattening the stock. In several cases I have heard of, and which I know to be true, excellent results have bean obtained by using superphosphates only, but I think the weight of evidence will support the theory that if lime be added to the grass lands the superphosphate will have a much better effect than if the lime be omitted. If the soil is licking in lime super may, and probably will. cause a rank growth of grass, but it will not produce fat healthy stock,

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"Another sheep farmer in a very large way told me a few days ago that on an estate he had recently bought in the Barossa district he had grass from 6 to 12 inches high, with sheep running about in it as poor as crows, and he was making efforts to prove that that estate could carry double the number of sheep that it had been carrying the last few years. Although I urged the use of lime, he seemed to think that superphosphate was the thing

every probability of a shortage of phosnent increase in the output from the land "I have often found that where a report phoric acid in the soil, but pointed out

to every branch of primary production."

"I think there is little doubt but that farming methods in South Australia have enormously improved the last 30 years, but the question is. 'Are farmers doing some of the simple things that were wellknown to practical farmers of the old 'It was a matter of common observation that country, who had nothing in the way of But there was one impor-In addition to the addresses by Dr. of the soil by the heavy rains," of lime. It is no exaggeration to say fine contribution by Professor Perkins at the amount of mineral nutrients removed from that long before the expiration of even the Agricultural Bureau Conference held at from the land by the annual crops of livestock 100 years by our present neglect of lime. Second Valley on August 6. I regret to phates were of these nutrients, the phose the soils of South Australia will have Second Valley on August 6. I regret to phates were of special importance on account of deteriorated to such an extent that we say that my experience among the farmers the low phosphate content of Australian soils, shall get no crops at all unless the farmers pay attention to at least one simple thing that has been proved for ages, and that is the replacement of lime in the I do not mean by that they should neglect the use of super. That would be nothing short of madness, but it should not be forgotten that while soil is composed of many elements, some of which are unknown, the one thing that should be better known perhaps than any other is lime, and that is the one that is and has been the most neglected in Aus-

> "In addition to the addresses by Dr. Richardson, mention should be made of the fine contribution by Professor Perkins at the Agricultural Bureau Conterence, held at Second Valley on August 6. valuable information concerning the use of lime, which has for years been given by the professor, has not been taken advantage of to the extent that might reasonping will wear away a stone, it is just

action on the mechanical condition of soils, and