ploughing. He considered that by so doing the best soil was turned in.

Mr. Williams replied that in some soils—some sandy soils, and some alluvial soils—there was very little difference in the extent and composition of the soil for several feet. Deep ploughing would not do much harm in their case, but there were certain other soils with very shallow surface soils, in which deep ploughing would bring up the subsoil to the surface. That was bad for more than one reason. One was that very often it was too loamy and gravelly, and at other times it was too clayey, and by bringing that up to the surface it did not do the surface soil any good; it did not improve the tilth. Another thing was that in the subsoil the plant food was not in an available soluble form probably. The soluble form was ploughed down to the depth of a foot or so and the other soil was brought up in which the amount of available food was not so great. Another reason was that they very often in the subsoil there were poisonous compounds—compounds of iron— due to the lack of oxidisation. When that was brought up to the surface it rendered the soil more or less unfertile. It all depended on the depth of soil as to whether deep ploughing was beneficial or not.

Mr. Hibberd asked if having ploughed up that soil, Mr. Williams could give them any idea of the length of time it would have to remain fallow to become fertile.

Mr. Williams replied that after two or three years the soil recovered its fertility almost entirely.

Mr. Hibbered asked if a fair crop could be expected for the start and that it would improve after the first crop.

Mr. Williams replied that it would improve later.

Mr. H. O. Andrews asked why it was that some soils on the Coast, which were very sandy, but had been heavily timbered in the past, appeared to be exhausted in a very short time. He thought that was the experience of a good many people. Having carried heavy timber one would naturally expect it to be full of humus.

Mr. Williams stated that as a rule the soils on the Coast were very sandy, but porous. The organic matter that was in these soils became oxidised very rapidly. The organisms worked very rapidly—more so than in a stiff clay soil, and the humus was changed as he had explained before into carbon dioxide and moisture and there was nothing left; also the plant food accumulated in the surface soil which was not absorbed by the growing crop was very speedily washed down by percolation into the underground drainage. In that way the soil was speedily impoverished unless by proper cultivation and fertilisation its fertility was maintained, the addition of humus and fertilisers would be the main requirements for such soil, as it would be very easily turned over and cultivated, and as he had said too much of that could be done with a soil of that nature.

THE PLOUGH, ITS DRAFT PRINCIPLES UNDERLYING ITS USE, ETC.

By B. P. AIRD, Engineer, School of Agriculture, Cedara.

Mr. P. B. Aird, Engineer, School of Agriculture, Cedara, then addressed the members on the subject of "THE PLOUGH; ITS DRAFT, PRICIPLES UNDERLYING ITS USE, ETC," as follows:—

"I intended to say the plow was the foundation of success in connection with agriculture but Mr. Williams has taken the wind out of my sails now (laughter). However, I want to point out to you several little things that we all know but do not usually carry out in connection with that implement known as the plow. We do not give it the consideration that it deserves. Before doing that I wish to take the opportunity of accepting the invitation of Mr. Townsend to visit his farm. I would like to get to "Compensation." What he has mentioned is the type of soil erosion pockets that they use in several of the rubber estates. They make pockets between the trees about every eight feet. I think they are four feet deep and 2 feet wide and they collect the soil and stop the loss.

Now in connection with the plow there are several points that we often overlook. I am not speaking now of steam plowing of which I know nothing. As a matter of fact I don't know much about the other kind of plowing; it is too much hard work and being a Civil servant I am not very fond of it! (Laughter). The principal point I would like to draw your notice to is in connection with the hitch of the plow. Afterwards, with acknowledgments to Dr. Cleghorn of Potchefstroom, I would like to draw to your notice the desirability or advisability of using wider yokes in South Africa. I usually ask the farmer if he has a plow handy on the farm and he invariably says "yes," and turns out one with apologies. Rather than ask a sugar planter to-day I went to Geo. North's, because the last one I had was rather rickety—all the

bolts were slack—but I was told it was the end of the season! (Laughter). I found that on the right handle there were some nice pieces of wire wound round it—not just plain wire, but barbed wire! I came to the conclusion that that was so that the boy would get a better grip on the plow. (Laughter). We have a great consideration for the boy who handles the plow, hence the barbed wire which could not be got off, not even with a hammer and chisel.

To begin with all parts of the plow should be nice and firm. If it was properly set there would be less likelihood of the plow becoming slack. Practically the only plow on the South African market that might be considered balanced is the 16 inch plow. Like any other plow it can be set fairly accurately before it reaches the hands of the native. Minor adjustments may have to be made to suit the particular soil. These are very important and are generally overlooked. Now in connection with the clevis or the hitch. If you could get that properly set then there would be at least one difficulty overcome. It is very simple. It depends on the type and the depth you are plowing. When working with oxen we find that the yoke of the present day type is hitched to the plow by means of a chain 8 ft. 6 ins. long. Now the distance from this stick to the knot in the string is 8 ft. 6 ins. (demonstrates with a stick and piece of string) representing the chain. Now this plow is designed to plow 5 ins. We are inclined to get it to plow in deep. In this case we have a 10 in. plow designed for breaking up purposes. We will take it that we are breaking up virgin soil and the furrows should be 10 ins. wide and 5 ins. deep. The 5 ins. are marked on the plow like this (demonstrates on plow). Now we will place the string at the 5 in. mark and stretch it from the point of hitch on the oxen and that indicates that the line should pass through the hitch. The height of the stick represents the height where the yoke is on the soulder of the oxen— 4 ft. 6 ins. high. By placing a string in the position I have done, the point of hitch should be adjusted accordingly (proceeds to demonstrate various positions for plowing at different depths). If you go to the average farm you find these simple methods are not observed. If we pull from the bottom naturally we are lifting the plow up and if we put the bar up we are pulling it on to its nose. If we get the correct position the plow rides at its proper level. At one time there was great difficulty in setting a plow, but to-day that has been more or less overcome.

The next point is the centre point of draft and that is, generally speaking, two inches from the land side of the plow. I made the statement that there was only one plow which was balanced properly and that was the 16 in. plow. I will endeavour to illustrated how that comes in (proceeds to illustrate on the blackboard). The standard South African yoke is 3 feet between the skeys. You will thus see that a 16 in. plow is balanced, that it suits our South African conditions and therefore, must be much easier on the oxen. If we take the 10 in. plough that we have with us this afternoon and make the same calculations we want a yoke with the skeys 2 feet apart. In that case if we had a yoke 2 feet wide that unit would be balanced, but as it is now, with our system of harnessing oxen we find that they would be too close together to work. So we realise that the oxen should be closer together but with the South African conditions of 3 feet the yoke is further out than the plow. The result is that we find our single furrow plows are inclined to run on the nose into the land, and to be pulled over by the oxen. That means that it is a hard strain on the plowman to operate as he is constantly trying to pull the plow straight to counteract the pull over by the oxen. For the South African farmer and the sugar planter who has big tracts of land to plow, it would probably be advisable for him—if he cannot afford a tractor or steam plow—to adopt the use of the three furrow plow rather than the single or two furrow. In the two furrow plow the favourite is probably the two furrow 12 ins. cut, but that you will find does not work quite correctly. The man who is anxious to get that balanced puts a harrow alongside of it to help to balance that unit. It is just a few inches out. We will go through the same formula again (illustrates on board). It will be seen that to get the best results with this class of plow our yokes should be 3 ft. 4 ins. between the centre of the skeys. By using a yoke of this description you will find that the oxen will do much better work and you will eliminate your repair bill on the two furrow plow. You will notice that most plows of the mouldboard type have a piece of iron sticking out to enable the boy to manipulate the plow and keep it to its work. On most farms this will be found to be loose because with the 3 ft. yoke the plow has always the tendency to nose into the land and give too large a cut and the boy to overcome that pulls at this handle and pulls it too much. Then we come to the three furrow plow. The same theory applies (illustrates on board). The result is that 4 ft. 4 ins. is the actual size of the yoke between the skeys when handling a three furrow 12 inch plow. We are indebted to Dr. Cleghorn for these figures and for the trials he has made. If you take it down to £. s. d. it will be seen that if we use on our farm three 2 furrow plows, and to operate these three plows we require 36 oxen, we also require in the form of labour six boys. By switching over from the three 2 furrow plows to two 3 furrow plows we get the same amount of work accomplished under very much better conditions, easier on the oxen and on the plow. You only use 28 oxen and 4 boys, this making a saving of 8 oxen, and you have two boys to run after the tennis balls on the farm (laughter) and do odd jobs. So you will see that you require to study this as a commercial proposition and you will find it to your advantage to adopt it. Irrespective of the cost of the yoke you have greater work done by the oxen, it is easier on them, you use less oxen and boys, and your repair bill will be minimised greatly. (Applause).

Mr. Rapson asked if Mr. Aird had the formula for working out the centre of draft for the disc plow on the same basis as for the mouldboard plow.

Mr. Aird replied that he had not, although he thought the same thing would apply more or less to the disc plow. The point of hitch, the clevis, was the same, but Dr. Cleghorne, who had the matter in hand, had not yet definitely ascertained the correct point of hitch for a disc plow. The experiments which had been carried out so far went to prove that the amount of draft on a disc plow was far heavier than on a mouldboard plow.

Mr. Rapson pointed out that on the coastal belt their work was done by the single furrow plow and very few double or three furrow plows were used for the reason that to use a 3 furrow plow they would have to use the same furrow on the return journey. He asked if Mr. Aird would recommend the use of mules in preference to oxen seeing that by using the single furrow plow the centre of draft would be thrown out by the present yoke.

Mr. Aird replied that he thought better results could be obtained by using mules as the swingle-trees could be altered much more conveniently than the yoke. The same applied to horses or donkeys.

Mr. Armstrong asked if Mr. Aird was correct in saying that the disc plow was heavier to pull than the mouldboard plow. If so could he give the scientific reason for that? Secondly he asked, what length the trek chain should be from the point of contact to the stock? Natives were very fond of hitching on a double trek chain, which of course was too long.

Mr. Aird replied that unconsciously some operators altered it by putting on a longer chain; they did not know the reason why. He had seen good plows under competition at Cedara losing the championship for the lack of knowledge as to the proper hitch. "This represents the difficulty you speak of (indicating a short piece of wire). That has to be added on to the plow to make it deeper," continued Mr. Aird. Some farmers believed in deep plowing.

Mr. J. Armstrong asked which was the easier, to have a short chain or a long chain.

Mr. Aird replied that he had been taught that if the horses were hitched close to the plow it was an advantage to the horses, but for the plowman it was an advantage for him to get the horses as far away as possible. But the correct method was governed by the length of trek chain. If the animals were further away it was probably a little heavier on them, but they were governed by the line coming from the shoulder or neck of the oxen, the horse's shoulder, or the mule's breast, according to the animals being used. As to the disc plow it had been proved beyond doubt that all things being equal the disc plow was heavier draft than mouldboard.

The Chairman thanked Mr. Aird for his remarks and the manner in which he had illustrated the various points on the board. (Applause).

FOOD TO GROW FOR STOCK EMPLOYED ON THE CANE FARM.

By C. EDELMAN, Agricultural Experimentalist, School of Agriculture, Cedara.

Mr. C. Edelman, Agricultural Experimentalist, School of Agriculture, Cedara, then addressed the meeting on "FOOD TO GROW FOR STOCK EMPLOYED ON THE CANE FARM," as follows:—

"I am afraid when there is such a good lecturer here as Mr. Townsend that you have picked on the wrong man in me. I daresay he is perhaps five times more experienced than I am, and could give you much more valuable information than I could. (Mr. Townsend: Not a bit of it). The subject "Food to Grow for Stock Employed on the Cane Farm" is somewhat of a complicated topic to talk on in view of the fact that very little food for stock is grown on the cane farm owing to the expense of the land. I must admit from the outset that I am up against a stone wall and my object is to try and make a slight dent in that wall. Bear it clearly in mind, please, that I have not come here to tell you to grow food for stock instead of sugar cane. I daresay sugar cane farming pays better than growing feed for stock. If it doesn't pay I do not know what really does pay. I go among the maize farmers and they say mealies do not pay. If I go back a year afterwards they are growing twice as much, I suppose to lose twice as much! (Laughter). I do not know if the cane farmer does the same, but what I know is that cane land is expensive and in many cases you can buy the food cheaper than you can grow it, bearing in mind what one acre of cane is worth. What we want to study then, before growing any crops for stock, is whether we can grow and feed those crops at a profit; whether the land is suitable for that kind of farming or whether you will be better off by just going on with cane and by buying whatever concentrated feeding stuff you require from time to time. But as I have just said, I am going to try and make a small dent in that wall by looking ahead. We never know what might be the position in say fifteen to twenty years time or even before that, and we might arrive at such a position