

THE POSSIBILITIES OF INTENSIVE GRASSLAND MANAGEMENT IN THE SUGAR CANE BELT OF NATAL

By D. MOSES

Mr. D. Moses (of African Explosives & Industries, Ltd.) read the following paper on the above subject:—

It may perhaps be considered strange that a paper of this nature should be read at a gathering of Sugar Technologists, yet it is a subject of considerable importance and one that is receiving such world-wide attention that it should be worthy of consideration by sugar planters in Natal. Any crop which, in practice, can be fitted in to the existing agricultural routine of the coastal belt will be welcomed by many farmers, and particularly will this be the case with those planters who realise the inherent weakness of a cropping system based on a single crop. For many years past, investigations have been pursued in an endeavour to find profitable alternative crops on the sub-tropical Natal coastal belt, and it is therefore felt that the intensive system of pasture management is worthy of your consideration.

In brief, the intensive system of grassland management differs from the practically uncontrolled system hitherto in vogue amongst South African farmers in four main particulars. First the area is divided up into small camps or paddocks, the number and size depending, of course, upon the area available. These camps are then fertilised according to the plan decided upon by the farmer and are then grazed in rotation by the stock available, so that the animals always graze on young grass 3 to 5 weeks old. Finally, although by this method the grazing season is lengthened, the fact that there is a definite peak in production in summer is borne in mind and provision is made for the period of low production. The mower is therefore used, not only to keep the grass within bounds and prevent the formation of coarse tufts, but to cut some of the surplus grass of summer for conservation in the form of hay or silage.

This system is a comparatively recent innovation in most countries where it has been tried and much experimental work will be needed, particularly in South Africa, before many of the practical details are worked out to fit in with local conditions. The remarkable growth in the number of adherents to this system, however, in New Zealand, Australia, Great Britain, Germany, and other countries, augurs well for its economic possibilities. In South Africa, intensive grassland management may be said to be still in its infancy, but the following practical considerations may be put forward at this stage:—

The camps may vary from one to twenty acres in size with the most convenient and economic size being from five to ten acres. Furthermore, while

it would be possible to rotate fairly successfully with as few as four camps, the system will work better with from eight to twelve camps. Thus the area of land required will vary from say ten acres up to 120 acres depending on the circumstances of the farmer.

With regard to the stock best fitted for the intensive system, it appears that the most conclusive results are obtained with dairy cows. The scheme will work, however, equally well with beef cattle, while we are accumulating evidence to the effect that rotational grazing can be carried out successfully with sheep. Experiments are also now being conducted in England to determine the value of rotational grazing for pigs.

In the coastal belt of Natal, the area to which we find the sugar cane industry confined almost exclusively, climatic conditions seem to be very favourable. From a pasture point of view conditions in this area compare very favourably with those obtaining in some of the best grassland areas of the world. For instance, the average annual rainfall is practically nowhere below 30 inches, while in parts it is as high as 40 inches to 50 inches, and furthermore this rainfall is well distributed throughout the summer months from October to March. In most parts the rainfall is fairly good also in September and in April, so that a grazing season of at least eight months is possible. Of course droughts do occur, but in this respect the coastal belt is more fortunate than the rest of the Union, and a general drought of long duration is almost unknown. Finally, some grazing may be obtained even during the winter months, while where small irrigation schemes could be brought into being or low-lying moist areas utilised, the problem of winter feeding might almost be solved entirely without purchase of fodder, such as lucerne and the like.

With regard to the grasses to be used in this scheme, a preliminary survey reveals that our choice is almost unlimited. Sod forming grasses, such as Kikuyu, Coast grass *Dactyloctenium aegyptium*, kweek or couch *Cynodon dactylon*, flourish under local conditions, while numerous others that are propagated by seed also grow luxuriantly. Examples of these are Guinea grass or Ubabe, *Panicum maximum*, Rhodes grass *Chloris gayana*, Finger grasses *Digitaria* spp. *Paspalum dilatatum* and numerous others. The carrying capacity and behaviour of these grasses under intensive management are now being studied, and it is therefore somewhat early to make definite assertions, but the ability of some of these grasses to thrive in our existing pastures, notwithstanding the severe treatment they have been subjected to up to the present,

is almost a sure sign they will do well under scientific management. No mention has been made of exotic grasses such as Cocksfoot, Rye Grass, Yorkshire Fog and many others, but there is also the possibility that several of these may prove of great value.

It may be of interest to note that under scientific management at Cedara, where the rainfall is 32 inches per annum, over 1,000 gallons of milk have been produced in one year from an acre of fertilised kikuyu grass. In other words, at a cost of £1/11/3 per acre for fertiliser, approximately 480-lbs. butter-fat were obtained from one acre in nine months. This compares very well with yields obtained anywhere else in the world, and provided diseases do not prove to be the limiting factor, there seems to be no reason why similar results should not be obtained in this area.

As to how this scheme may be fitted into the present farming system, it will be argued and rightly so that the erection of fences and purchase of stock will prove a stumbling block for most farmers. It must be remembered, however, that these are capital charges and are spread over a period of years, and there seems to be no alternative to sugar cane growing that will not call for expense in one direction or another.

The planting of grasses and pasture mixtures will probably cost no more in the long run than the planting of an equivalent area of cane, and if well managed the grassland areas may be even more permanent. The fertiliser programme may call for from 600 to 800 lbs. of fertiliser per acre per annum, but to the average progressive cane-grower these amounts will not sound as high as they might to his up-country brother farmer. Finally if the product is to be milk, butter or cheese, some equipment in the nature of dairies and dairy utensils will be required, but here again whether farmers co-operate or not, there are few alternatives to sugar-cane growing that do not call for some initial expense.

Perhaps one other aspect should be considered before concluding this paper, and it is the marketing aspect. It may be argued that just as there is an over-production of sugar at present there may be a world over-production of pastoral products. In this connection it must be pointed out that other sugar producing countries are more favourably placed in regard to economic production of sugar than we are, and consequently they will always be in a position to produce sugar cheaper than we will be able to in Natal. On the other hand, the Cedara results show that with regard to pastoral products there is a possibility that we will be able to produce at a cost which will enable us to compete with some of the leading pastoral countries of the world, and hence our position may be made more secure than it would be if we relied entirely on sugar production as we have in the past. Furthermore, it has been

estimated that the United Kingdom alone consumes annually, live stock products derived mainly from grasslands, to the value of £400,000,000, while over 60 per cent. of all the sea-borne exports of dairy products and beef are imported into Great Britain. With Italy and other countries also becoming of importance as importers of pastoral products, the marketing situation shows great possibilities.

In conclusion it should perhaps be emphasised that the intensive system of grassland management has as yet scarcely had a thorough trial under South African conditions, and much of the detail still remains to be worked out by means of careful experimentation. Enough is known, however, to support the claim made here that the sugar cane belt is potentially one of the best grassland areas of the Union and as such may be developed by scientific methods into one of the richest of our agricultural areas.

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The CHAIRMAN said they had to thank Mr. Moses for bringing to their notice a problem which at first seemed outside their scope, but which on study appeared to be one of interest to all planters. The use of land as grassland was a thing which had been done very haphazardly in the past; planters had taken grass as grown for them by nature and nothing had been done to help it along and get the best out of it. Nowadays they could take nothing like that, and with the competition everything had to be helped and scientifically investigated. A few weeks ago he (the Chairman) was travelling through East Griqualand and had noticed experiments being carried out by one of the Fertiliser Companies in which they had divided areas up into small paddocks and were experimenting with different types of fertilisers on grasslands. Sheep were grazing in some of these paddocks, and he wondered at the time what criterion of comparison was used for the valuing of the different fertilisers. Probably Mr. Moses could tell them how these comparative tests were made.

Mr. MOSES stated that when he started to write his paper he did not think the drought would continue as long as it had; in general though he thought the drought question was not as serious in this part of the world as it was in other parts. His Company had a number of grassland experiments in different areas of the Union, including two in East Griqualand. In East Griqualand, at the site which Mr. Moberly had noticed, sheep were being rotated from camp to camp and the figures obtained as to the number of grazing days afforded by the different camps; in other words, the farmer noted the number of sheep put in the different camps and the length of time they were there. Only one camp was in

use at a time except where it was found there was more grass than the sheep could consume, in which case they had been running some cattle before the sheep were put in. That, however, was somewhat out of the sugar cane belt, and he would like to bring to their notice that they had also started an experiment at Umbogintwini on twelve acres of pasture which had been very seriously over-grazed. He extended an invitation to any sugar cane farmers and others interested to see the experiments next season. They had not done anything to the pastures except fertilise them, and were rotating dairy cows on them; they hoped to obtain figures with regard to milk yield and get an idea how the existing pastures could be filled up without actually re-seeding under proper methods.

Mr. ASKEW said there was no doubt the pastures of Natal might be greatly improved, but he did not think there was any room for this scheme on the sugar belt of Natal because they had not the land available for grazing. All the farms were more or less of 500 acres, and some of the planters were ploughing out grasslands to put them under cane. No doubt the scheme might be taken up-country as the time was coming quickly when they should seek to improve the grasses of the country, but it would not suit them on the small sugar farms on the coast.

Mr. PALAIRET said he was rather interested to hear this paper at the moment as a large number of planters were taking an interest in this particular problem. There were some areas where almost every planter was planting up a small acreage with improved grass. There were some planters who were convinced that in time they would almost transfer from cane to dairying, but he very much doubted that, although he did feel that there was going to be a partial change on the small farms. As Mr. Dodds had been continually impressing on the planters their great trouble was lack of humus, the solution was generally given as green manure, but green manure was simply a palliative where they had not got the ideal, and he thought it was recognised the world over that the best thing was animal manure. If a man was going in for really intensive work in his cane, and a small portion of his farm was intensively run with dairy cattle, he was going to get his quantity of animal manure and his cane would benefit accordingly. It had to be remembered that the profits from cane were in some cases minus 10/- and in some cases minus £1 per acre, but they did not get this £40 profit which had been obtained and could be obtained with dairying. It would also help materially in their great problem of over-production of cane.

Mr. FOWLIE said he would like to say a word or two on the subject, chiefly on the possibility of going in for cattle along with cane. He had taken an interest in cattle and worked with them for a great part of his life, and he thought on the Coast there were possibilities of going in for cattle with-

out getting rid of cane altogether, and possibly in some cases cattle could be made to pay better than cane was paying at the present time, especially on the farms which were rather unfavourably situated for getting cane to the mills cheaply. He thought Mr. Moses' paper helped considerably to put one aspect of the matter forward, but he would also like to draw attention to the fact that on their cane farms to-day without intensive grasslands they had an enormous amount of stock feed going to waste so to speak because there were no animals to use it. He did not think that cane tops were exactly an ideal milk producing ration alone, but cattle, and perhaps dairy cattle as much as any were animals with enormous appetites for what was generally known as "roughages," and cane tops made an excellent "roughage" to supply bulk food for dairy cows as well as for other animals. Provided they had a reasonable amount of concentrated food added to make up a balanced ration they could do very well on cane tops. Cane tops could come in to supplement the pastures. They had cane tops all through the dry winter season when grass was limited, and if they went in for comparatively small areas of intensively farmed pastures they could maintain herds of dairy cows comparatively cheaply throughout the year. At present when the cane tops were finished at the end of the crushing season there was no food on the average farm to give the cattle until the next cutting season. If the idea put forward in the paper could be adopted combined with feeding with cane tops in the winter it would give all the year round a stock of bulk feed. At present he did not think it would be advisable to go into the question of what would be necessary to supplement that further than to say that one of the possibilities on cane farms of growing stock feeds was on fallow lands. They recommended under present circumstances green manure crops, and these were excellent, but in his opinion green manure crops had not got as much value to the planter as a crop growing for stock feed, provided he had the animals to utilise it and make the best of it. For crops of that nature they had a selection of one or two legumes, such a soya beans, the Mauritius velvet bean, which was probably a little rough as stock feed, but even so made a hay which was quite palatable and good food, and these would go a long way to balance up cane tops and lessen the amount of more expensive foods which would be required for the purpose.

Mr. DODDS stated he agreed with Mr. Palaret's and Mr. Fowlie's views on this matter. He thought the first occasion on which he had publicly advocated the practice of green manuring was at the Sugar Week in 1925, when he remarked that green manuring was perhaps not an ideal method of restoring organic matter to the soil, but it seemed to be the best and most practical for the conditions here in view of the general assurance he met with on every hand at that time that the dairy industry

was out of the question. It was found that green manuring was not practised, for example, in countries such as Britain where they had a large cattle industry. It was found much more preferable to grow a rotation crop in the form of a fodder crop for animals and eventually return some of it in the form of organic matter to the soil as Mr. Fowlie had suggested. He thought if a dairying industry could in some way be adapted to coast conditions on the cane belt it would be a better way of restoring organic matter than the next best practice of growing green manure crops.

Mr. MOSES in reply stated that he wished to emphasise that this scheme had been adapted to the coastal belt. They knew that it could be put into practice up-country, but it was for the coastal belt conditions that he had tried to write the paper. A few months ago his Company had a prominent official of Chemical Industries, Ltd., out here—a gentleman who not only had very extensive grassland experience in Europe and England, but had also extensive experience in Australia and New Zealand. He had come to this country almost direct from two years' work in New Zealand, and as soon as he came to the coastal belt he had exclaimed that he thought they had just as good grassland here as they had in some parts of New Zealand which they valued at £70 per acre. A man with experience such as he had ought to have some idea of what he was talking about. Mr. Moses said he admitted it was rather hard for a man who had spent the best part of a generation growing sugar cane to be told by a young man like himself to give it up and try

something else; but as Mr. Palairt had pointed out, what they had to consider was whether they should continue growing cane at a loss or try something else which from what they could see was almost bound to give them a profit. After all there was something wonderfully comforting about a monthly cream cheque!

Mr. PATRICK stated that he thought they were very much indebted to Mr. Moses for his paper, but he had not touched on one possibility. One of the speakers had pointed out that at one time there was no green stuff for the cattle; that was one of the greatest arguments for Mr. Moses' scheme. They had had to replace oxen with mules and so on. There was one method of reducing costs of production if they could get back to the old ox, and they could do it if planters were prepared to put ten to fifteen acres under kikuyu or similar grasses. It would reduce transport costs infinitely, and those acres of grassland would be infinitely more valuable per acre than the land they were now growing cane on.

Mr. PENBERTHY stated that with regard to the statement about Cedara growing kikuyu grass it would never compare on the South Coast. He had grown kikuyu grass for ten years on the South Coast and he had noticed the grass up-country, but it could not be grown any higher than about seven inches on the South Coast. It was very drought resistant however. He had it all round his house and lawn, and it was the only grass which had really kept green on the South Coast. He was afraid, however, that from a dairy proposition it would not do there.